

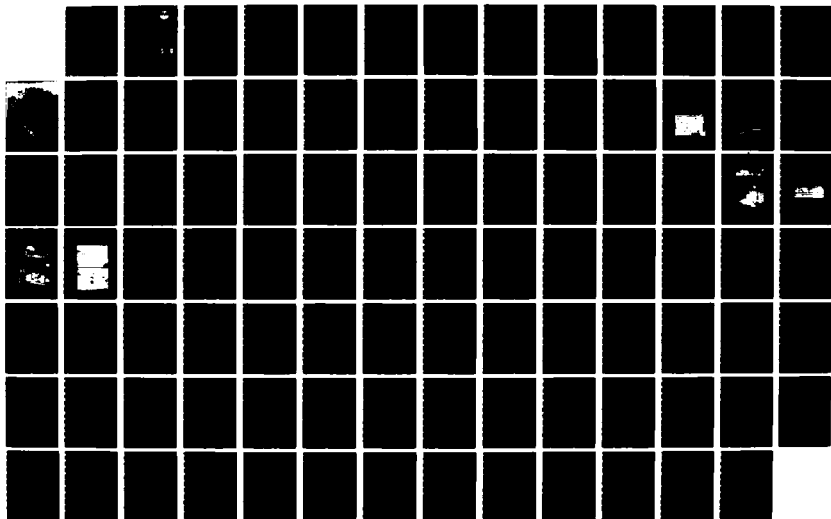
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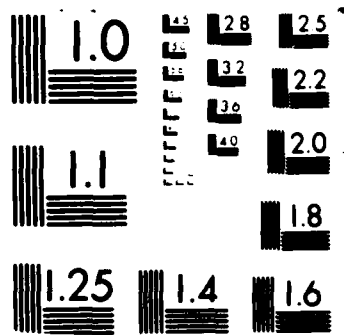
WASTEWATER CHARACTERIZATION AND HAZARDOUS WASTE SURVEY
HICKAM AFB HAWAII (U) AIR FORCE OCCUPATIONAL AND
ENVIRONMENTAL HEALTH LAB BROOKS AF R D BINOVI ET AL
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USAFOEHL REPORT

87-064EQ0688EEF



**WASTEWATER CHARACTERIZATION AND
HAZARDOUS WASTE SURVEY, HICKAM AFB HI**

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May 1987

Final Report

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USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

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<p>The USAFOEHL characterized the industrial wastewater in the Hickam AFB sewers and conducted a hazardous waste survey. The scope of the survey included characterizing the major industrial wastewater discharges from the base and determining if applicable discharge standards are being violated. A total of 23 sampling sites were evaluated including 10 lift stations and 10 oil/water separators. The hazardous waste survey included visiting 44 shops to determine chemical usage and hazardous materials management practices including collection, storage, disposal practices and accumulation points.</p> <p style="text-align: right;">(Keyed)</p>				
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Seawater infiltration of the sewer was found causing chloride concentration limitations to be exceeded at four locations. Seawater was also contributing to high chemical oxygen demand (COD) concentrations. The COD limitation was exceeded at 11 locations. The photographic wastewater from building 2045 exceeded the limits for chlorides, sulfides, phenols, silver, and chromium.

Recommendations: (1) Determine where the seawater is infiltrating the sewers and take action to reduce the chloride level to below the limit. (2) Install a pretreatment plant for the 548 RTG photographic wastewater. (3) Develop a comprehensive waste analysis plan. (4) Increase hazardous waste monitoring (5) Service the silver recovery cartridge at 548 RTG.

ACKNOWLEDGEMENTS

The authors greatly appreciate the technical expertise and hard work provided by the other members of our survey team, 1Lts Fran Slavich and Mary Daly, SSgt Mary Fields, Sgts Pete Davis and Ross Simmons, without whose valuable assistance this survey could never have been accomplished.

We also acknowledge the help Mr George Fujimoto, Maj Roberto Martinez-Perez and the staff of the Bioenvironmental Engineering Section gave us during the survey. Thanks for making us feel welcome in the Aloha State.

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I. INTRODUCTION

HQ 15th Air Base Wing (ABW) requested the USAF Occupational and Environmental Health Laboratory, Brooks AFB, Texas to conduct a detailed survey of the Hickam AFB sanitary sewage system to identify and characterize the industrial wastewater discharge to the Fort Kamehameha (Ft Kam) sewage treatment plant.

The wastewater survey was conducted from 13 January to 27 January 87 by Lt Col Robert D. Binovi, 1Lts Mary Daly and Francis E. Slavich, SSgt Mary M. Fields, Sgt Ross W. Simmons and Sgt Robert P. Davis. The hazardous waste survey was conducted by Major Elliot K. Ng and 1Lt Robert A. Tetla. Major Roberto Martinez Perez, Chief, Bioenvironmental Engineering Services and Mr George Fujimoto, Environmental Coordinator were points of contact at Hickam AFB.

The scope of the survey included the characterization of the wastewater from eight lift stations, eight oil/water separators, and effluent from the photo processing unit. Flow measurements were performed from three lift stations and determined from pump hour meters at five others. Furthermore, a comprehensive evaluation of the base hazardous waste program was conducted.

II. BACKGROUND

A. Introduction

Hickam AFB is a peculiar military installation by virtue of its geographical location. To the west and north is the Naval Facility at Pearl Harbor, to the east is Honolulu International Airport and to the south is the Pacific Ocean. Within the boundaries of the base are tracts of land owned by the Army (Fort Kamehameha) and the Navy (Bishop Point). Base working population was approximately 5000 military and 2000 civilians. Approximately 12,000 people live on base.

The 15th Air Base Wing supports HQ PACAF located on the base. Aircraft support is provided by maintaining C-135 and T-33 aircraft. The 154 FIG (HANG) provides training for Air Guard personnel in the F-4 aircraft.

The climate at Hickam AFB is characterized by the remarkably equable temperature ranges from day to day and season to season, the persistence of trade winds, and the rarity of severe storms. The range in normal temperatures between the warmest month, August, and the coolest month, February, averages only 9.0° F. Annual precipitation averages about 22 inches at the airport.

B. Sewerage System

The base sanitary and industrial sewage is collected and transported by gravity and by pressure lines to a Navy operated activated sludge sewage treatment plant. All sewage from the base is either gravity fed or pumped to Lift Stations 1 and 1A then pumped to the plant. At one time a small industrial wastewater plant had been installed near the aircraft washrack but the chemical addition and treatment equipment have been removed. The plant serves now as an oil/water separator.

The major industrial operations involve aircraft and vehicle maintenance along Hangar Avenue, facility and vehicle maintenance along Kunz Avenue, and aircraft and vehicle maintenance along Nelson Avenue by the Hawaii National Guard.

A NPDES compliance evaluation inspection of Fort Kamehameha sewage treatment plant was performed by Region IX, USEPA on 7 August 1985. To determine if they are complying with federal effluent and applicable pretreatment guidelines, the EPA recommended that the Navy submit a detailed assessment of all industrial wastewater discharges from both the naval base and Hickam AFB. Their contention is that although the Ft Kamehameha treatment plant "usually complies with the federal guidelines for secondary treatment, the Discharge Monitoring Reports (DMRs) do not indicate whether the current discharges from the Ft Kamehameha WWTP adversely affect state water quality. Limited sampling indicates that the Ft Kamehameha WWTP may indeed adversely affect water quality."(1) EPA seems to think that metals such as silver, cadmium, chromium, nickel, lead and zinc may be in the Ft Kamehameha effluent in concentrations high enough to impact marine organisms. Although not observed, EPA believes that large uncontrolled flows of oil in the WWTP could cause the discharge of oils and grease at levels high enough to violate the state water quality standards.

C. Discharge Limitations

Discharge limitations for Hickam are established by Naval COMNAVBASEPEARLINST 11345.2A (2) because of limitations set on Fort Kamehameha by NPDES permit and state water quality regulations. The discharge limitations that apply to Hickam AFB are given in Table 1.

D. Hickam AFB Previous Surveys

A wastewater characteristics survey was conducted in 1977 at Hickam AFB by the USAFOEHL/OLAB, McClellan AFB CA.(3) It was concluded that Hickam wastewater is not detrimental to the Ft Kam STP. Hickam AFB wastewater represented 19% of the total flow loading, 27% of the total BOD loading, 31% of the total COD loading, 22% of the total suspended solids loading. They measured 4900 gallons per day average from the photo processing shop and 9540 gallons per day from the motor pool and aircraft washrack measured at lift station 1A.

An industrial waste study was conducted in 1979 by Kennedy Engineers on Pearl Harbor and Barbers Point areas including Hickam AFB. Samples were taken from the Hickam main as it entered the Ft Kam sewage treatment plant. The significant findings were:

TOC and oil and grease concentrations were in the normal range for domestic wastewater.

The maximum BOD concentration was significantly high particularly when compared to the relatively low maximum VSS concentration.

TABLE 1
EFFLUENT LIMITATIONS

Parameter	Limits (mg/l unless specified)	
	avg.	max.
1. Temperature	120	150
2. pH	6-10 units	
3. Color	No discoloration	
4. Chlorine Demand	20	50
5. Sulfides	0.5	5
6. Biochemical Oxygen Demand	200	600
7. Total Suspended Solids	300	600
8. Chemical Oxygen Demand	600	1200
or Total Organic Carbon		
9. Oil and Grease	75	150
10. Oil and Grease (hydrocarbon)	25	50
11. Surfactant (MBAS)	15	30
12. Cyanide	0.1	0.2
13. Chloride	5000	8000
14. Sulfate	600	1000
15. Fluoride	2	5
16. Antimony	0.1	0.5
17. Arsenic	0.1	0.5
18. Beryllium	0.1	0.2
19. Cadmium	1.0	2.0
20. Chromium (Total)	2.5	5.0
21. Chromium (Hexavalent)	0.25	0.50
22. Copper	0.5	2.5
23. Lead	0.1	0.5
24. Mercury	0.01	0.05
25. Nickel	0.5	1.0
26. Selenium	0.2	1.0
27. Silver	0.5	1.0
28. Thallium	0.1	0.5
29. Tin	2.0	10.0
30. Zinc	2.5	5.0
31. Phenolic Compounds	1.0	2.0
32. Total Identifiable Chlorinated Hydrocarbons	0.02	0.04
33. Polychlorinated Biphenyls (PCB)	0.01	0.02
34. Benzene & derivatives	1.0	2.0
35. Formaldehyde	1.0	5.0
36. Organic Solvents	0.5	2.5
37. Strong Oxidizing Agents	1.0	5.0
38. Strong Reducing Agents	1.0	5.0
39. Radioactive	As established	
40. Prohibited Items:		
	a. gasoline, fuel oil, other flammable or explosive materials.	
	b. toxic or poisonous materials	
	c. ashes, cinders, mud, etc.	
	d. Unusual volume of flow or concentration of wastes	
	e. Nonbiodegradable substances	

Chlorides and sulfides concentrations and chlorine demand were significant. Similar to the influent wastewater from the Pearl Harbor Naval Base, the amount of brackish water infiltration appears to comprise about 15% of the total flow. The resulting sulfate concentration would be in the order of 500 mg/L and would contribute to sulfide production in higher than desirable concentrations.

Heavy metals were detected in relatively low concentrations in the Hickam Air Force Base wastewater and were generally lower than those in the Navy's wastewater. PCB was the only detected chlorinated hydrocarbon.

Weston performed an Environmental Compliance Assessment and Management Inspection and published a draft in March 1985.(4) They identified two possible areas of industrial discharge, the motor pool and aircraft corrosion control washrack facilities oil/water separator and the Air National Guard maintenance area. Weston did not do any sampling but recommended a survey characterizing the industrial effluents should be performed.

III. PROCEDURES

A. Sampling

1. Sampling Site Numbers and Locations. A list of sampling site numbers and locations where the samples were taken is shown in Table 2. Locations of the Hickam sampling sites are shown in Figure 1.

2. Lift Station Site Description

a. Site 1, Manhole 227. This manhole serves as the confluence of four main sewers servicing most of the base, excluding lift stations servicing Ft Kam and the Air National Guard, which are connected directly to lift station 1A. From lift stations 1 and 1A, the sewage is pumped to the Ft Kam plant.

b. Site 2, Lift Station 12 services the Air National Guard industrial complex and discharges to Ft Kam plant.

c. Site 3, M.H. 234, This manhole receives the effluent from the photo reconnaissance building 2045 lateral sewer.

d. Site 4, L.S. 5, building 2178. This lift station services facilities along Taxiway 8, the control tower, fuels and fuel storage, and some civil engineering shops.

e. Site 5, L.S. 6, Bldg 1628. Receives flow from Site 5, housing and discharges into a 30" pressure main. Does not flow to Site 1.

f. Site 6, L.S. 7, Bldg 3021. Receives flow from Site 7, and one other small building, T-3038 and the jet test cell.

g. Site 7, L.S. 8, services building T-3225.

n. Site 8, L.S. 10, this lift station services the ANG and pumps to site 1. The submersible pump had been removed during the survey

l. Site 9 Bldg 84 L.S., this lift station services warehouses near the Guard area, pumps into a force main near site 8.

j. Site 10, bldg 87 L.S. This lift station seems to have been bypassed by L.S. 12. No flow was observed.

k. Site 11, bldg 358A services Hawkins Battery, discharges to Ft. Ram plant.

i. Site 12, bldg 7474 L.S. discharges to a 30" Navy pressure main, does not flow to site 1. Services housing and an extensive auto hobby shop.

TABLE 2

SITE NUMBERS OF LOCATIONS WHERE SAMPLES WERE TAKEN

Lift Stations and manholes

Site No.	Samples Site Locations
1	M.H. 227 (conv. of sewers before LS 1 and 1A)
2	L.S. 12 (main L.S. for HANG area)
3	M.H. 234 (sewer from Bldg 2045)
4	L.S. 5, bldg 2178
5	L.S. 6 bldg 1628
6	L.S. 7, bldg 3021 (not sampled, no flow)
7	L.S. 8, bldg T-3225
8	L.S. 10, Near Bldg 3404
9	Bldg 84 L.S.
10	Bldg 87 L.S.
11	Bldg 358A L.S.
12	L.S. Bldg 7474

Oil/water separators

13	Bldg 3004 Refueling Hangar
14	Bldg 2016 Aircraft Washrack and Motor Pool
15	Bldg T-2130 Ref. Maint. washrack
16	Bldg T- 3428 Hangar washrack
17	Bldg 3429 Hangar, motor pool
18	Bldg 2010 Refueling maint.
19	Bldg 2153 Fuels (not sampled-empty)
20	Bldg 11665 Test cell
21	Bldg 2074 BX Gas Station
22	Bldg 4002 Auto Hobby Shop
23	Bldg 1263 C.E. Paint Shop

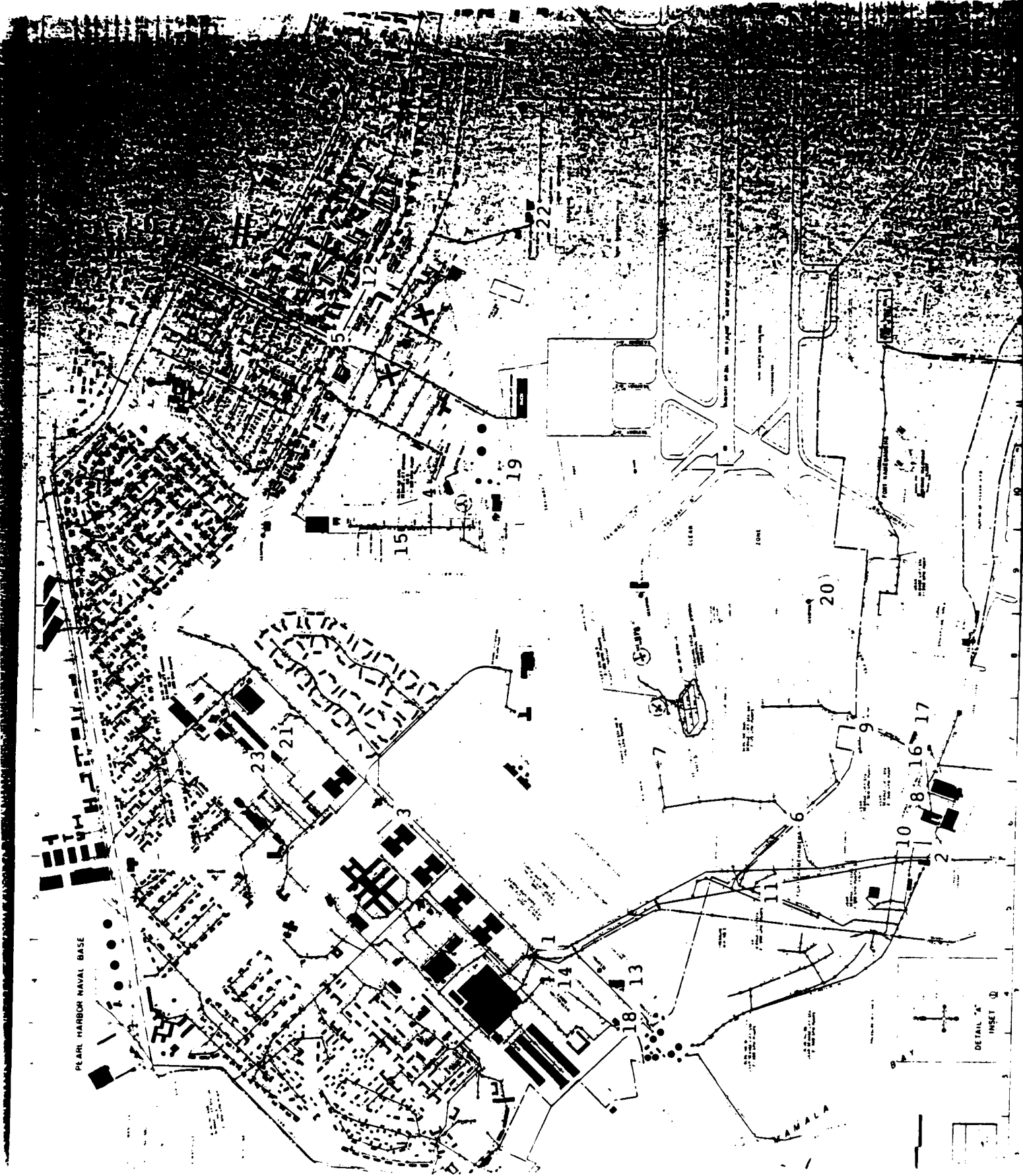


Figure 1. Site Locations

3. Sampling Frequency

Daily collection of the 24 hour composite samples was accomplished at the wastewater sampling sites 1-12 indicated at Table 2. Sites 1 and 2 were sampled for seven days, site 3 was sampled for three days. Sites 4 to 12 were sampled for one day. Grab samples were taken at the Hickam AFB oil/water separators. Additionally grab samples for EPA methods 601 and 602 and for total organic halocarbons were taken at the same frequency as the composite samples. Samples were analyzed for the parameters listed in Table 3.

B. Flow

As will be discussed in the hazardous waste section of this report, the industrial operations at this base have intermittent discharge, except for the photoprocessing operation in building 2045. Flow monitoring of intermittent discharges is beyond the scope of this project. Flow measurement was conducted at the accumulation of these intermittent discharges at lift stations servicing industrial wastewater. Flows were either determined by recording the number of times per day sumps were pumped out or from pump hour meters. Flows were recorded at the locations given in Table 4.

C. Hazardous Waste Survey

A comprehensive hazardous waste survey was conducted. The survey team performed a shop-by-shop evaluation of chemical waste management practices and met with hazardous waste managers and engineers to discuss the hazardous waste program. Chemical usage and disposal were documented by shop personnel during the survey and visits were made to accumulation sites on base and to the Defense Reutilization and Marketing Office (DRMO) at Pearl City, Hawaii. A description and highlights of the waste management practice of the shops surveyed are included in the Results and Discussion section of this report.

TABLE 3

ANALYSIS AND SAMPLE PRESERVATION METHODS

PARAMETER	PRESERVATION	EPA METHOD	WHERE	WHO
Biochemical Oxygen Demand (5-day)	none	405.1	on-site	USAFOEHL
Chemical Oxygen Demand	H ₂ SO ₄	Hach Mod. 410.4	on-site	USAFOEHL
pH	none	A423	on-site	USAFOEHL
Temperature	none	170.1	on-site	USAFOEHL
Total Suspended Solids	4C	A209F	on-site	USAFOEHL
Oils and Grease	H ₂ SO ₄	413	Brooks AFB	USAFOEHL
Phenols	H ₂ SO ₄	420.1	Brooks AFB	USAFOEHL
Pesticides	H ₂ SO ₄	608	Brooks AFB	USAFOEHL
Volatile Hydrocarbons	H ₂ SO ₄	624	CA	TMA
Acid/Base/Neutrals	4C	625	CA	TMA
Metals(As,Cd,Cr,CU,Pb,Hg, Ni,Se,Ag,Zn,Sb,Be,Tl,Sn)	HNO ₃	AA	Brooks AFB	USAFOEHL
Total Cyanide	NaOH	335	Brooks AFB	USAFOEHL
Nitrate-Nitrite	H ₂ SO ₄	353	Brooks AFB	USAFOEHL
MBAS	NONE	425.1	Brooks AFB	USAFOEHL
Chloride	NONE	325	Brooks AFB	USAFOEHL
Color	NONE	110	Brooks AFB	USAFOEHL
Fluoride	NONE	340.2	Brooks AFB	USAFOEHL
Sulfate	NONE	375.2	Brooks AFB	USAFOEHL
Sulfides	NONE	376.2	Brooks AFB	USAFOEHL
Total Organic Carbon	H ₂ SO ₄	415.1	Brooks AFB	USAFOEHL

Notes: A - Standard Methods For the Examination of Water and Wastewater
All other methods are USEPA methods. (5)

AA - Atomic Absorption Methods, EPA Section 200.0 (6)

TABLE 4

FLOW MEASUREMENT TYPES AND LENGTH

SITE*	SITE	FLOW TYPE	No. DAYS
1	L.S. 1	pump meter	13
1	L.S. 1A	pump meter	13
3	Bldg. 2045	water usage	11
4	L.S. 5, 2178	pump meter	4.8
5	L.S. 6, 1628	measurement	1
6	L.S. 7	pump meter	no flow
7	L.S. 8	measurement	3**
8	L.S. 10	approximate pumping times	8
2	L.S. 12	measurement	7
9	Bldg 84 L.S.	measurement	1
10	Bldg 87 L.S.	pump meter	no flow
11	Bldg 358A L.S.	pump meter	4.9
12	Bldg 7474 L.S.	measurement	***

* - Corresponding Sampling Site Number

** Problems with the flowmeter

*** Unable to measure, pumps cycled too fast

IV. RESULTS AND DISCUSSION

A. Wastewater Characterization Survey

1. A summary of the flow data is presented in Table 5.

TABLE 5

RESULTS OF FLOW MEASUREMENTS

Location	Avg. Daily Flow (X1000 gal/day)
L.S. 1	0.0
L.S. 1A	2531.3
Bldg 2045	11.7
L.S. 5	97.7
L.S. 6	358.5
L.S. 7	0.0
L.S. 8	3.3
L.S. 10	23.8**
L.S. 12	13.5
Bldg 84 L.S.	123.7
Bldg 87 L.S.	0.0
Bldg 358A L.S.	2.9
Bldg 7474 L.S.	***

** Inaccurate based on approximate pumping times

*** Unable to install measuring device at this location

2. Biochemical Oxygen Demand

Discharge limitations for BOD from a point source discharge is 300 mg/l 30 day average with 600 mg/l maximum concentration allowed. No sites results exceeded the maximum allowable concentration, but the value of the average allowable concentration was found to be exceeded by the photographic wastewater from building 2045 (325 mg/l), building 3426, HANG vehicle washrack oil/water separator (445 mg/l) and from Lift Station 10 servicing among others, building 3426 vehicle washrack (380 mg/l).

3. Chemical Oxygen Demand and BOD/COD Ratio

Discharge limitations for COD from a point source discharge is 600 mg/l for a thirty day average and 1200 mg/l the maximum concentration allowed. The maximum concentration was exceeded by samples from the oil/water separator in the HANG area at building 3426 washrack (2050 mg/l), vehicle maintenance oil/water separator, building 3429 (3145 mg/l), the separator at refueling maintenance, building 2010 (5700 mg/l), Lift Station 10 servicing HANG (7000 mg/l), the large flightline separator near building 2016 (6000 mg/l), building 7474, lift station (1300), lift station building 358A (5700 mg/l), and the base service station oil/water separator building 2074 (See Table 6). Some COD results should be disregarded because of the high levels of chlorides in the samples (See Table 7).

The BOD/COD ratio is an indication of the industrial nature of a sewage, as lower values indicate a less easily biodegradable waste, more amiable to reaction with strong acids. Wastewater contaminated with oil products, for example, have low BOD/COD ratio since the petroleum products are not readily biodegradable, or soluble for that matter, but can be degraded by the strong acid of the COD reagents. The acid-dichromate COD test suffers from chloride interference. Generally, values of 0.4 and higher indicate a waste more domestic in nature. The BOD/COD results are presented in Table 6.

4. Total Suspended Solids (TSS)

Results are shown in Table 6. Two sample sites exceeded the maximum allowable one-day concentration of 600 mg/l. These sites were lift station 10 and the Civil Engineering paint shop, with concentrations of 1071 and 1204 mg/l, respectively. Lift station 1A had a 7-day average of 103 mg/l, and lift station 12 averaged 118 mg/l for the same period. Both of these values are well below the 30-day standard of 300 mg/l. The Bldg 2045 photo shop had 3-day average of 48 mg/l.

5. Heavy Metals (As, Cd, total Cr, Cr⁶⁺, Cu, Pb, Hg, Ni, Se, Ag, Zn, Sn, Sb, Be, Tl)

Results for the two 7-day sites are shown in Appendix A. Neither site had a single metal parameter exceed either the maximum allowable one-day or 30-day average concentrations. Generally, the concentrations found at these two sites were quite low.

TABLE 6
TOTAL SUSPENDED SOLIDS (TSS), BIOCHEMICAL
OXYGEN DEMAND (BOD), CHEMICAL OXYGEN DEMAND (COD)
AND BOD/COD RATIO RESULTS

Site	TSS	BOD	COD	BOD/COD
	-----mg/l-----			
Lift station 1A	103	127	1170	.11
Lift station 12	118	197	503	.39
Bldg 2045 (Photo Recon)	48.3	325	820	.40
Bldg 3426	40	445	2050	.21
Bldg 3004	54	200	250	.80
Bldg 3429	367	240	3145	.08
Bldg 2010	111	160	5700	.03
Lift station 10	1071	380	7000	.054
Bldg 2016	223	93	6000	.016
Test Cell	30	NR	210	NR
Bldg 1628 lift station	152	193	440	.44
Bldg 4002	89	80	300	.27
Bldg 7474 lift station	29	NR	1300	NR
Bldg T2130	30	NR	370	NR
Bldg 2178 lift station	20	103	200	.52
Bldg 358A	53	NR	1500	NR
CE Paint shop	1204	NR	5700	NR
Lift station 8	48	86	220	.39
Bldg 84 lift station	60	64	170	.38
Base service station	NA	NA	8200	NR

Note: Results for lift stations 1A and 12 are 7-day averages, and results for Bldg 2045 are 3-day averages.

TABLE 7

COMPARISON OF COD, TOX, AND CHLORIDE CONCENTRATIONS

Site	Location	COD(mg/l)	TOX (mg/l)	CHLORIDE (mg/l)
1	M.H. 227 (L.S. 1&1A)	*1170 (AVG.)	*.179 (AVG.)	10,311 (AVG.)
2	L.S. 12	503	*.149 (AVG)	1,067 (AVG.)
3	M.H.234(548RTG)	*820	*.039	12,000
4	L.S.5, BLDG 2178	*200	*.048	10,000
5	L.S.6, BLDG 1628	440	.022	110
7	L.S. 8, T-3225	220	.116	
8	L.S. 10, BLDG 3404	*7000	*.117	3500
9	L.S. BLDG 84	84	*.020	700
11	L.S. BLDG 358A	*1500	*.331	100,000
12	L.S. BLDG 7474	1300+	*.094	1,880

Oil/Water Separators

13	BLDG 3004	250	.060	104
14	BLDG 2016	*6000	*.086	17,000
15	T-2130	370	.034	67
16	T-3428	2500+	.116	89
17	T-3429	6000+	.084	78
18	BLDG 2010	*5700	*.113	5,750
20	BLDG 11665	210	.027	130
22	BLDG 4002	300	.611	105
23	BLDG 1203	8200+	.063	120

** Disregard TOX results when chloride concentrations exceed 500 mg/l and COD results if chlorides exceed 2000 mg/l. (5,10)

+ Exceeds maximum 1 day concentration limitation of 1200 mg/l COD

Results for the remaining sites are shown in Appendix B. Two sites had metal concentrations which exceeded discharge limitations. These were the Civil Engineering paint shop, and at building 2045, 548 RTG. A mercury concentration of 9.73 mg/l was found in the paint shop oil/water separator. This value is almost 200 times greater than the maximum allowable concentration of .05 mg/l. Silver was found at building 2045 at concentrations of 3.1 and 13.7 mg/l, with a 3-day average of 5.6 mg/l. These values greatly exceed the maximum and average discharge limitations of 1.0 and .50 mg/l, respectively. In addition, discharge limitations for hexavalent chromium were exceeded at building 2045. The maximum concentration found was .50 mg/l, with a 3-day average of .42 mg/l. The corresponding standards are .50 and .25 mg/l.

6. Chloride

Results for the two 7-day sites are shown in Appendix A. Lift station 1A exceeded the maximum allowable one-day concentration of 8000 mg/l on two days when concentrations of 36,000 and 23,000 mg/l were found. The 7-day average concentration of 10,311 mg/l was also substantially higher than

the value of 5,000 mg/l as a 30-day average allowed under the state discharge limitations. Lift station 12 exceeded the maximum one-day concentration on one occasion; however it did not exceed the 30-day average standard of 5,000 mg/l.

Chloride results for the remaining sites are shown in Appendix B. Four sites exceeded the maximum allowable one-day concentration of 8000 mg/l. These were building 2016, building 358A lift station, building 2178 lift station, and the building 2045 photo shop. The highest concentration found was 100,000 mg/l at the building 358A lift station. In addition, the 3-day average concentration at building 2045 of 5,543 mg/l exceeded the 30-day average standard of 5,000 mg/l.

7. Sulfides

Results for the two 7-day sites are shown in Appendix C. Neither site exceeded the COMNAVBASEPEARL Discharge Limitations. Results for the remaining sites are shown in Attachment 4. A concentration of 6.67 mg/l was found at lift station 10. The maximum allowable one-day concentration is 5.0 mg/l. One-day concentrations of 22.0 and 8.0 mg/l, with a 3-day average of 10.0 mg/l were found at the building 2045, 548 RTG. This average value is 20 times greater than the 30-day average standard of 0.50 mg/l.

8. Sulfates

Results for the two 7-day sites are shown in Appendix C. Lift station 1A had a maximum value of 600 mg/l and a 7-day average of 484 mg/l. Lift station 12 had a maximum concentration of 320 mg/l and a 7-day average of 248 mg/l. Neither of these sites exceeded the COMNAVBASEPEARL Discharge Limitations of 1000 mg/l as a one-day maximum and 600 mg/l as a 30-day average.

Results for the remaining sites are shown in Appendix D. Building 2016, old industrial treatment oil water separator, had a one-day concentration of 1900 mg/l, and the building 358A lift station had a one-day concentration of 1440 mg/l. Both of these values exceed the maximum allowable concentration of 1000 mg/l. None of the remaining sites exceeded either of the sulfate limitations.

9. Total Organic Carbon (TOC)

TOC results are shown in Appendixes C and D. None of the sites exceeded either COMNAVBASEPEARL Discharge Limitation of 1200 mg/l as a one-day maximum or 600 mg/l as a 30-day average for this parameter.

10. Oil and Grease (Total)

All 7-day site results are shown in Appendix C. The 7-day averages for lift stations 1A and 12 were 39 mg/l. This value is well below the 30-day standard of 75 mg/l. Neither site exceeded the maximum allowable one-day concentration of 150 mg/l. Results for the remaining sites are shown in Appendix D. Lift station 10 had a measured concentration of 560 mg/l. This value is almost four times greater than maximum allowable concentration of 150 mg/l. None of the remaining sites exceeded either of the two standards for this parameter.

11. Cyanide (CN)

Cyanide results for all sites are shown in Appendixes C and D. None of the sites exceeded the State Discharge Limitations for this parameter. The highest concentration found was only .03 mg/l.

12. Phenols

All 7-day site results are shown in Appendix C. Lift station 1A had a 7-day average concentration of .087 mg/l, while lift station 12 had an average concentration of .047 mg/l. Both of these values are far below the 30-day standard of 1.0 mg/l. Neither site exceeded the one-day maximum concentration of 2.0 mg/l during the sampling period.

Results for the remaining sites are shown in Appendix D. The photo shop at building 2045 was the only site to exceed discharge limitations for phenol. A maximum concentration of 3.0 mg/l and a 3-day average of 1.46 mg/l was found at this site, both of which exceed the aforementioned standards of 2.0 and 1.0 mg/l. The highest one day concentration found at the remaining sites was 1.4 mg/l.

13. Fluoride

Sampling results for all sites are shown in Appendixes C and D. The 7-day averages for lift stations 1A and 12 were .71 and .75 mg/l respectively. The highest one-day concentration found at the remaining sites was 1.1 mg/l at lift station 358A. Each of these values is well below the discharge limitations of 5 mg/l as a maximum one-day concentration, and 2 mg/l as a 30-day average.

14. Methylene Blue Active Substances (MBAS)

Results for the 7-day sites are shown in Appendix C. The highest one-day concentration for lift stations 1A and 12 were .60 and .70 mg/l, respectively; and their corresponding 7-day average concentrations were .50 and .43 mg/l. All of these values are well below the discharge standards of 30 mg/l as a maximum one-day value, and 15 mg/l as a 30-day average.*

Results for the remaining sites are shown in Appendix D. A one-day concentration of 156 mg/l was found at the building 3426 washrack. This value is approximately five times greater than the maximum allowable one-day concentration of 30 mg/l. None of the remaining sites exceeded the MBAS standards. The next highest concentration found was 8.0 mg/l at the Civil Engineering paint shop.

15. Total Identifiable Chlorinated Hydrocarbons

Two methods of evaluating this parameter were used. Concentrations of chlorinated hydrocarbons detected in Methods 604, 608, 624, 625 were totaled. Methylene chloride was the only chlorinated hydrocarbon found. It was detected on one day at lift station 12 at a concentration of .22 mg/l. This value is approximately 10 times greater than the maximum allowable one-day concentration of .04 mg/l. It should be noted that the contract laboratory did not analyze five samples for EPA Method 624 volatile organic

hydrocarbons within the 14 day recommended holding time. Some samples exceeded this criterion by five days.

Another test, the Total Organic Halogen (TOX) quantifies this category also. The maximum one day concentration limit of .04 mg/l was exceeded in grab samples from every site except at two lift stations servicing essentially domestic sources, lift stations buildings 84 (.020 mg/l) and 1628 (.022 mg/l) and the photo effluent from building 2045. The sites that exceeded 0.04 mg/l were the Auto hobby shop, building 4002 separator (.611 mg/l), Lift station 7474 servicing building 4002 (.094 mg/l), Lift station 87 (0.056 mg/l), Lift station 10 (.117 mg/l), the C.E. paint shop sump, building 1203 (.065 mg/l). Effluent entering lift stations 1 and 1A, (.065-.401 mg/l) and lift station 12 (.069-.434 mg/l). However, TOX results should be disregarded at lift stations 1A and 12 because chloride concentrations greater than 500 mg/l were present. See Attachments 1 and 2 for results of chloride analysis. The results of the TOX testing are shown in Appendixes C and D.

Small quantities of pesticides were found at a few sites and no PCBs were found in samples from any sites. See Appendix E for results.

16. Benzene and Derivatives

Results are shown in Appendix F. Benzoic acid and toluene were the only benzene derivatives found during the survey. Benzoic acid was detected for two days at lift stations 1A and 12. The highest concentration found at 1A was .210 mg/l, while lift station 12 had a high concentration of .17 mg/l. Toluene was detected at lift station 1A for one day at a concentration of .005 mg/l. These values do not approach the discharge standards of 2.0 mg/l as a maximum one-day concentration, and 1.0 mg/l as a 30-day average.

17. Organic Solvents

Results are shown in Appendix 6. Acetone was detected for two days at lift station 1A and for one day at lift station 12. The greatest concentration found was .480 mg/l at lift station 12. 4-methyl-2-pentanone was detected for one day at a concentration of .027 mg/l at lift station 12. All of these values are below the standards of 2.5 mg/l as a maximum one-day concentration, and .50 mg/l as a 30-day average.

18. Temperature and pH

Results for all sites are shown in Appendix G. None of the sites exceeded any of the temperature and pH discharge limitations. The greatest temperature recorded was approximately 80 degrees F, which is well below the standards of 150° F and 120° F for a one-day maximum and 30-day average, respectively. All sites were within the pH range of 6-10 dictated by the State Discharge Limitations. The lowest pH value was 6.5 at Bldg 2045 and the highest value was 8.1 at lift station 8.

B. Hazardous Waste Survey

A summary of general waste disposal practices is in Appendix H. A complete listing of chemicals used along with their National Stock Number and Mil Spec is in Appendix I. The following is the results of the shop-by-shop evaluation of waste chemical disposal practices:

Shop: Clinic Dental Lab	Building: 559
Shop Supervisor: TSgt Lavelle	AUTOVON: 449-2440
L.S. Connection: 1A	

Personnel make and repair dentures, partial dentures and mouth guards. No chemical wastes are generated at this lab.

Shop: 15 CAMS Propulsion	Building: 1045
Shop Supervisor: Mr Nelson	AUTOVON: 449-2770
L.S. Connection: 1A	

The 15 CAMS Propulsion shop personnel repair, tear down and inspect T-76 and J-33 engines. The shop has three main sections (Figure 2): the T-76 shop, the J-33 shop, and the washrack. The only wastes generated in the two engine shops are waste oils.

The washrack area has 4 vats, but only one is used and it contains Penetone 23 (a cold stripper). The Penetone 23 has never been changed out, there is a water layer on top to prevent the Penetone from evaporating. Simple Green soap is used to clean engine parts at the washrack. The rinse water from this operation is discharged to the sewer.

A waste storage area is located outside this building for recyclable waste oil, contaminated waste oil, and halogenated waste products. A work order is pending to dike this storage area.

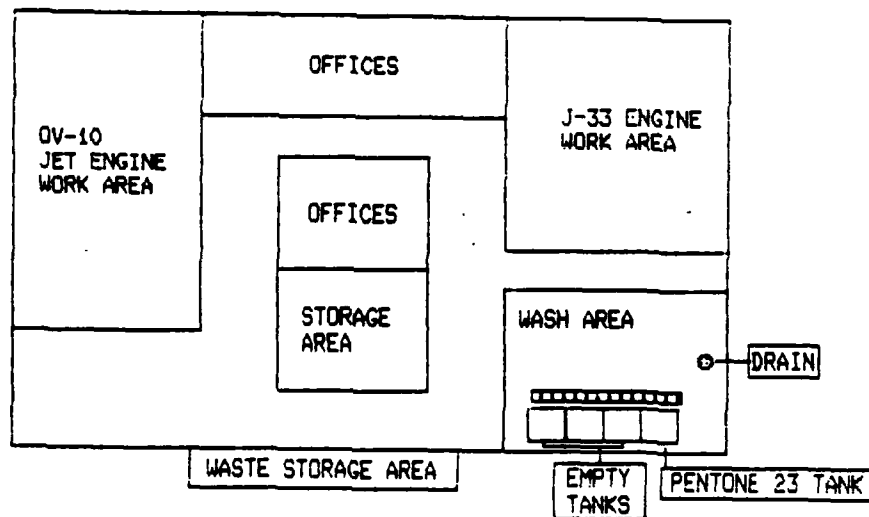


Figure 2. 15 CAMS Propulsion Shop Layout

Shop: 15 CAMS Corrosion Control Building: 1055
Shop Supervisor: Mr Sloan Autovon: 449-2426
L.S. Connection: 1A

The 15 CAMS Corrosion Control shop personnel strip paint from AGE equipment and aircraft components that go to NDI for inspection. AGE equipment is stripped using a waterwash sandblasting unit located in the building. This unit is not connected to the drainage system and the residual dry media is disposed of as nonhazardous waste. This unit will be replaced in Oct 87 by a completely dry sandblasting unit. Aircraft are not stripped on this base, however, aircraft components requiring touchup are sanded prior to painting.

T-33 aircraft are painted in both hangars A and B, all KC-135 aircraft requiring painting are sent to Tinker AFB. Aircraft parts are painted in three "oilfall" paint booths (similar to a waterfall with turbine oil instead of water, Figure 3). Oil from these units are removed semiannually by contract. The sludge is skimmed off and the oil is filtered before being returned to the booth. Waste paints and thinners are stored in 55-gallon drums and disposed of as hazardous waste through DRMO.



Figure 3. Oilfall Paint Booth

The Corrosion control shop is also responsible for the aircraft/AGE washrack on the flightline. Eldorado Aircraft soap (NSN

6850-01-181-7178/6850-01-184-3182) is mixed (1 soap:10 water) in a 1000-gallon tank and is air fed to the washrack (Figure 4). While the washrack is in operation the effluent gates (Figure 5) are opened to allow the rinsewater to enter the sewer. When the washrack is not being used the gates are set to allow rainwater to enter a storm drain. PD-680 (about 55-gallons per week, used at the washrack is placed in buckets and used to clean heavily soiled areas on the aircraft, i.e., jet tracks and landing gear.

There is a hazardous waste accumulation site adjacent to the washrack for waste from Corrosion Control and Motor Pool. A work order is approved to slab, dike, roof and fence this site.

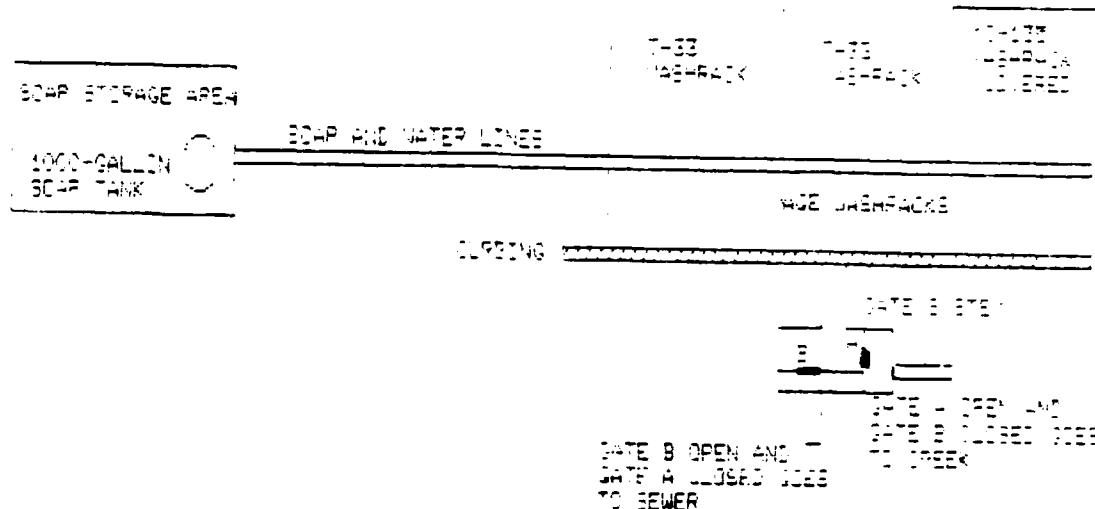


Figure 4. Aircraft Washrack

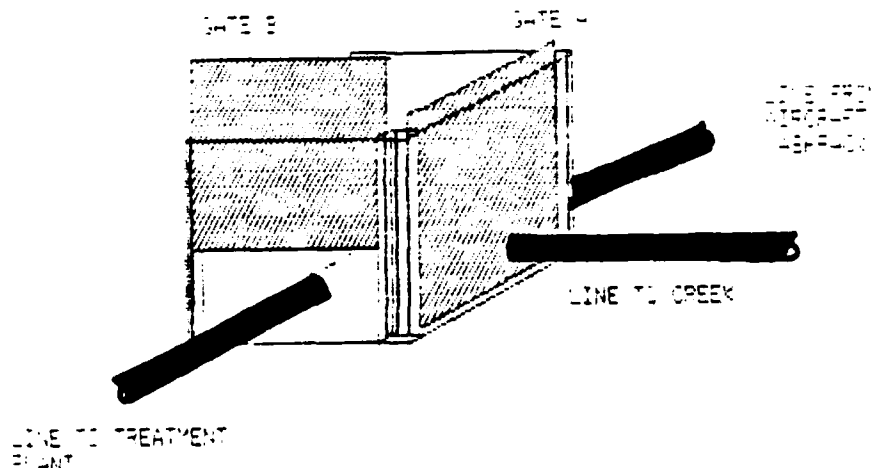


Figure 5. Washrack Gate System

Shop: 15 CAMS Wheel & Tire/Repair & Reclamation
Shop Supervisor: Mr Hamada/TSgt Stevens
L.S. Connection: 1A

Building: 1055
AUTOVON: 449-2693

The 15 CAMS Wheel and Tire shop personnel build and tear down wheel and tire assemblies. The 15 CAMS Repair and Reclamation shop personnel tear down and repair main landing gear and flight control surfaces.

The Wheel and Tire shop is divided into two areas: the bearing room and the wash room. The bearing room has two tanks (approximately 25 gallons each); one tank contains PD-680 and is used to clean and wash bearings; the other tank contains PD-680 and oil and is used to coat bearings with oil. These tanks are cleaned out once a year. Waste PD-680 is drained from the tanks and placed in 55-gallon drums and sent to DRMO for disposal.

The wash room is comprised of 7 tanks (Figure 6). One tank contains Mirachem 250 (acid), used to clean stainless steel wheel heat shields. According to shop personnel this tank has only been emptied once when the acid was neutralized and drained to the sewer system. Located next to this tank is a tank containing corrosive preventative compound (CPC). This tank has never been drained. A series of 5 tanks are used to strip paint from wheels. Two tanks contain a hot and a cold stripper. A wheel is placed in one of the stripping tanks, rinsed twice in different rinse tanks, then finally placed on the drying table. Wheels not needing stripping are washed in a tank containing Mirachem 100 (soap, NSN 6850-PNIS-G-8074) then transferred to the final rinse tank and placed on the drying table.

Spent solvent from the two stripping tanks is disposed of by pumping into 55-gallon drums and removed as hazardous waste through DRMO. When the two rinse tanks and the tank with Mirachem 100 needs to be changed, their contents are drained to the sewer system. Empty paint spray cans are punctured and thrown in the trash. Waste hydraulic fluid used in aircraft jacks is stored in 55-gallon drums and disposed of through DRMO.

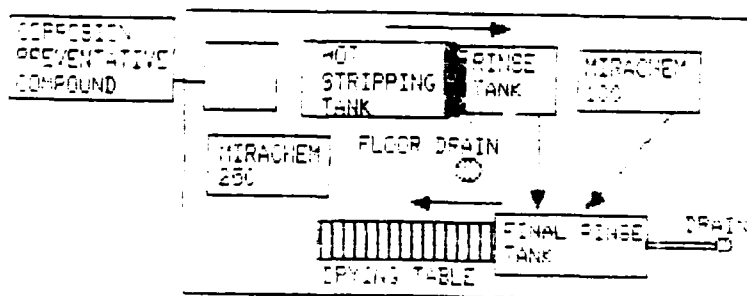


Figure 6. 15 CAMS Wheel and Tire Shop Washroom Layout

Shop: 15 CAMS Battery Shop
Shop Supervisor: MSgt Badia
L.S. Connection: 1A

Building: 1055
AUTOVON: 449-2419

The 15 CAMS Battery shop, operated by Electric shop personnel, is responsible for servicing batteries from HANG, HAFB, and Wheeler AFB. The shop neutralizes lead acid batteries with sodium bicarbonate before the batteries are placed in a bucket and allowed to sit for 24 hours. The battery is then removed and disposed of through DRMO. The neutralized acid solution is poured down the drain. This shop services approximately 20 lead acid batteries per month. The servicing of NiCad batteries involves adding small amounts of potassium hydroxide to the batteries and cleaning the exterior of the batteries. No wastes are generated from servicing NiCad batteries.

Shop: 15 CAMS Pneudralics
Shop Supervisor: MSgt Ripp
L.S. Connection: 1A

Building: 1055
AUTOVON: 449-1624

The 15 CAMS Hydraulic shop personnel tear down, inspect, clean, repair, reassemble and check all aircraft and AGE hydraulic assemblies. This shop has one PD-680 tank (approximately 15 gallons) that is changed out every 90 days. This is accomplished by draining spent PD-680 into a bucket. Then it is poured into a 55-gallon drum and labeled as contaminated hydraulic fluid and taken to an accumulation site.

Shop: TMDE (PMEL)
Shop Supervisor: MSgt Bobelak
L.S. Connection: 1A

Building: 1060
AUTOVON: 449-1318

The Precision Measurement Equipment Laboratory is responsible for repairing and calibrating test equipment. Approximately 10 pounds/year of waste mercury is turned into DRMO for resale.

Shop: 15 TRANS Special Purpose
Shop Supervisor: Mr Gardner
L.S. Connection: 1A

Building: 1073
AUTOVON: 449-6435

The 15 TRANS Special Purpose shop is responsible for the repair, overhaul and maintenance of special purpose vehicles and equipment, e.g., fire trucks. Waste engine oil is placed in a bowser and is picked up every three weeks by a contractor. Waste brake fluid, Simple, Green soap (NSN 6850-P100-DEGREAS used for vehicle, engine and floor washing) and antifreeze are all disposed of in the sewer. Battery acid is neutralized and drained to the sewer.

Shop: 1957 ISG Teletype Maint.
Shop Supervisor: TSgt Kampos
L.S. Connection: 1A

Building: 1102
AUTOVON: 449-9230

THE 1957 ISG Teletype maintenance personnel duties include repairing and maintenance of teletype machinery. No wastes are generated from this shop.

Shop: 1363 AVS Still Photo
Shop Supervisor: MSgt Googins
L.S. Connection: 1A

Building: 1102
AUTOVON: 449-6012

The 1363 AVS Still Photo personnel process and print black and white and color film using commercial photo chemicals. The shop uses a color negative process (C41), a black and white manual process, a color print process (EP2), and a color slide process (E6). All processes are changed out quarterly. Waste developers are disposed of down the drain along with waste fixers. Fixers are passed through a silver recovery process before disposal.

Shop: 15 CES Plumbing Shop
Shop Supervisor: Mr Correa
L.S. Connection: 1A

Building: 1202
AUTOVON: 449-2930

Civil Engineering Plumbing shop personnel install, maintain and repair plumbing systems. No wastes are generated from this shop.

Shop: 15 CES Paint Shop
Shop Supervisor: Mr Matsuo
L.S. Connection: 1A

Building: 1203
AUTOVON: 449-6642

Civil Engineering Paint shop personnel are responsible for painting buildings, signs, etc., at both Hickam and Bellows AFBs. Waste paints (oil and latex) and thinners are segregated and stored in designated 55-gallon drums. These wastes are taken to an accumulation site across from the paint shop. Empty paint cans are stored near the accumulation site with the lids off and allowed to dry. Once the paint is dried, the cans are thrown in the trash.

The shop is striving towards using strictly latex paints. The shop also has an oilfall paint booth similar to the one in the 15 CAMS Corrosion Control. The booth is cleaned out twice a year by contract. Used paint brushes are first cleaned with thinner and then rinsed in a sink outside the shop. The thinners used for cleaning the brushes are reused till dirty before they are placed in a 55-gallon drum and taken to the accumulation point. Paint wastes from the accumulation site are picked up by the Navy.

Shop: 15 CES Entomology
Shop Supervisor: Mr Matta
L.S. Connection: 1A

Building: 1218
AUTOVON: 449-6858

The Civil Engineering Entomology shop is responsible for pest control throughout the base. This includes chemical insecticide spraying of trees, homes, etc. The chemicals employed in this shop are used up in the process. Any chemicals left over are kept in the container and used at a later time. No chemicals are drained to the sewer.

Shop: Auto Restoration Center
Shop Supervisor: Mr Remigio
L.S. Connection: 7474

Building: 1720
Phone: 808-423-9002

Auto restoration center, operated by AAFES, performs vehicle body work and painting on personal vehicles. Waste paint and thinners are stored in 5-gallon containers and picked up by a contractor (Unitech). The shop has a Safety Kleen degreasing unit that is cleaned out biweekly by Safety Kleen Corporation. The shop also has a dry paint booth with no floor drain.

Shop: 15 TRANS General Purpose	Building: 2002
Shop Supervisor: Mr Yamamoto	AUTOVON: 449-2051
L.S. Connection: L.S. 1A	

The 15 TRANS General Purpose shop is responsible for the repair, overhaul and scheduled maintenance of general purpose vehicles and equipment. This shop has 3 Safety Kleen degreasing units that are serviced monthly. Waste antifreeze is diluted 1:1 with water and discharged down the drain. Waste oils and fluids are placed in bowlers and picked up every three weeks by a contractor. Waste brake fluid is disposed of down the drain. Battery acid is neutralized and drained to the sewer. Simple Green soap (NSN 6850-P-100-DEGREAS) used to wash vehicles and floors is diluted and discharged to the sewer.

Shop: 15 TRANS Body	Building: 2002
Shop Supervisor: none	AUTOVON: 449-2205
L.S. Connection: 1A	

The 15 TRANS Body shop responsibilities include welding, body repairs, corrosion control and painting. The shop operates two paint booths, both were out of service during the survey. A contractor cleans out the paint booth once every six months. The water is drained and the sludge is disposed of by contract. Waste paint and thinners are stored in 55-gallon drums and disposed of as hazardous waste.

Shop: 15 TRANS Diagnostic and QA	Building: 2002
Shop Supervisor: Mr Benoza	AUTOVON: 449-5355
L.S. Connection: 1A	

The Diagnostic and Quality Assurance shop is responsible for the inspection, diagnostic testing, and scheduled servicing of general purpose and special purpose vehicles and equipment. Battery acid from the battery shop is neutralized and disposed in the drain. Waste oil and fluids are stored in bowlers and taken away by a contractor every 3 weeks. Waste brake fluid and antifreeze are disposed of down the drain. This shop has a Safety Kleen degreasing unit that is serviced by Safety Kleen Corporation. Simple Green soap (6850-P-100-DEGREAS) is used to clean vehicles, engines and floors.

Shop: 15 TRANS Refueling Maint.	Building: 2010
Shop Supervisor: Mr Okino	AUTOVON: 449-2890
L.S. Connection: 1A	

Personnel of the 15 TRANS Refueling Maintenance Shop are responsible for the repair, overhaul, and scheduled maintenance servicing of refueling vehicles. Battery acid is neutralized and disposed of in the drain. Waste oils and fluids are stored in bowlers and taken by contractor every 3 weeks. Waste brake fluid and antifreeze are disposed of down the drain. This shop

has a Safety Kleen degreasing unit that is serviced by Safety Kleen Corporation. Simple Green soap (6850-P-100-DEGREAS) is used to clean vehicles, engines and floors.

Shop: 15 CAMS OMS MAAP
Shop Supervisor: SSgt Paige
L.S. Connection: 1A

Building: 2017
AUTOVON: 449-9393

The 15 CAMS OMS MAAP maintains Non-powered AGE industrial equipment, i.e., Liquid oxygen equipment. Waste Fluids are drummed and picked up by a waste contractor every 3 weeks.

Shop: 15 CAMS NDI
Shop Supervisor: TSgt Sommer
L.S. Connection: 1A

Building: 2030
AUTOVON: 449-1224

The 15 CAMS NDI shop is responsible for the non-destructive inspection of all aircrafts, aircraft components and flight line support equipment assigned to Hickam and Wheeler AFBS. The NDI lab is also responsible for non-destructive inspection of transient aircrafts. Waste photo chemicals are sent through the silver recovery process and then discharged to the sewer system. Waste penetrant and Magnetic particle premix are placed in 55-gallon drums and disposed of through DRMO. Waste developer and hydrophilic remover are disposed of down the drain.

Shop: 15 CAMS AGE
Shop Supervisor: Mr Simoes
L.S. Connection: 1A

Building: 2030
AUTOVON: 449-1561

The 15 CAMS AGE personnel maintain flight line support equipment. Waste oil goes to a 200-gallon bowser and is turned into DRMO. Waste hydraulic fluid is stored in 55-gallon drums. Waste paints and thinners, waste PD-680, jet and automotive fuels are stored in 55-gallon drums. Jet fuel is recovered by Fuel Maintenance Personnel (POL) and placed back into the main storage tanks. Automotive fuel is reused in AGE equipment. Waste paint, thinners, and PD-680 are disposed of through DRMO. Waste antifreeze is discharged to the sewer.

Shop: 15 CES Fire Department
Shop Supervisor: Chief Cox
L.S. Connection: 1A

Building: 2036
AUTOVON: 449-6391

The fire department is responsible for fire protection on Hickam AFB, Honolulu airport, and fire extinguisher and fire truck maintenance. Waste paint and thinners are placed in 55-gallon drums and disposed of through DRMO as hazardous waste. Contaminated JP-4 (less than 1000 gallons per year), uncontaminated fuel, and Aqueous Film Forming Foam (3% AFFF) for extinguishing fires are used in their fire training pit. Approximately 5 gallons per week of waste PD-680 solvent (NSN 6850 00 284 8012) and soaps (MSCI, NSN 6850-00-935-0996 or Penetone 1107, NSN 6850-00-753-5000) are used for washing 14 fire trucks everyday. The rinsewater is rinsed down the floor drain at the vehicle washrack.

Shop: 619 MASSQ FMS Jets
Shop Supervisor: James Meadon
L.S. Connection: 1A

Building: 2040
AUTOVON: 449-2040

The 619 MASSQ FMS Jet shop personnel are responsible for the maintenance of installed and spare aircraft engines and Turbo prop engines. Waste oil and JP-4 fuel are placed in 55-gallon drums. Waste oil is turned into DRMO while JP-4 is reused by POL if uncontaminated or it is sent to the Fire Department for used in the fire training pit if contaminated.

Shop: 619 MASSQ FMS AGE
Shop Supervisor: SMSgt Savage
L.S. Connection: 1A

Building: 2040
AUTOVON: 449-2040

Shop personnel of the 619 MASSQ FMS shop personnel service and maintain AGE equipment used on transient aircraft. Waste fluid, fuel, and oil are placed in 55-gallon drums. Waste fluids and oil are disposed of through a contractor, while waste fuels are reused by POL. All soap (MSCI Aircraft surface cleaning compound, NSN 6850-00-935-0995, MIL-C-25769J) used by this shop is diluted 1:25 and rinsed down the drain.

Shop: 619 MASSQ FMS Avionics
Shop Supervisor: Gregory Foley
L.S. Connection: 1A

Building: 2040
AUTOVON: 449-2040

The 619 MASSQ FMS Avionic shop is responsible for the replacement Of the C-141B and C-5A/B engine parts. The only waste generated from this shop is waste JP-4 that is placed in 55-gallon drums and either returned to POL if it is uncontaminated or given to the Fire Department for fire training.

Shop: 619 MASSQ FMS OMS
Shop Supervisor: SMSgt Scanson
L.S. Connection: 1A

Building: 2040
AUTOVON: 449-1517

Personnel of the 548 MASSQ FMS OMS shop is responsible for servicing and maintenance of transient MAC aircrafts. Waste oil, hydraulic fluid and JP-4 fuel are placed in individual bowers. The oil and hydraulic fluid bowser is drained by a contractor and JP-4 is reused by POL.

Shop: 548 RTG Chemical Mixing
Shop Supervisor: SSgt Johnson
L.S. Connection: 1A

Building: 2045
AUTOVON: 449-8220

The 548 RTG Shop personnel are responsible for mixing and analysis of all black and white processing chemicals used within the division. The chemicals are mixed in vats that gravity feed to other shops in the building. All photo wastes (approximately 1249 gallons/month before dilution) are disposed of into the sewer. The photo fixer is used on a closed system (Figure 7) most of the time. The system is opened when the fixer is no longer effective, at which time the fixer is sent through an automatic silver recovery unit prior to discharging to the sewer. The silver recovery system is suppose to be 98% efficient.

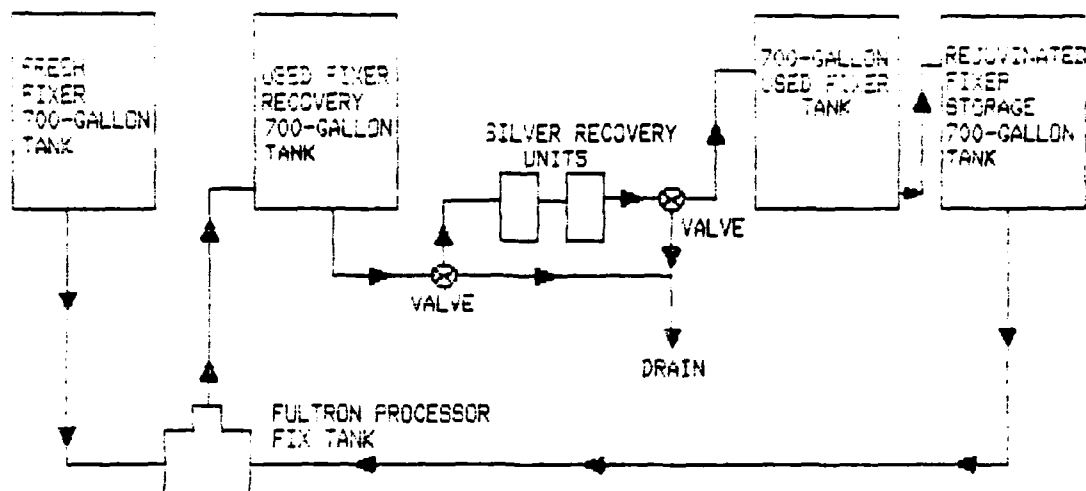


Figure 7. 548 RTG Fixer System

Shop: 548 RTG Precision Production
 Shop Supervisor: MSgt Krafft
 L.S. Connection: 1A

Building: 2045
 AUTOVON: 449-8247

The 548 RTG Precision Production shop personnel process and duplicate aerial reconnaissance imagery using continuous processing machines. Waste fixer (approximately 50 gallons/month), photo-flo (approximately 5 gallons/month), 641 Developer (approximately 20 gallons/month), and neutralized Hunts Fr (approximately 500 gallons/month) are disposed of down the drain.

Shop: 548 RTG Select Print
 Shop Supervisor: MSgt Lorenz
 L.S. Connection: 1A

Building: 2045
 AUTOVON: 449-8260

The 548 RTG Select Print is responsible for the production of black and white photos and view-graphs. The only waste generated here is tetrachloroethylene used to clean the negatives before printing and enlargement. This is placed in a 5-gallon container and is given to the Navy for disposal when the container is half full.

Shop: 548 RTG Color Print SPCC
 Shop Supervisor: TSgt Kneebone
 L.S. Connection: 1A

Building: 2045
 AUTOVON: 449-8260

Personnel of the 548 RTG Color Print produce color slides, view-graphs and prints using automated Hope E-6 and R-3 processing equipment. All photo wastes are sent through a silver recovery process prior to being discharged down the drain. Two color processing units are cleaned out quarterly. This cleanout generates about 320 gallons of waste chemicals that goes down the drain.

Shop: 15 CES Power Production
Shop Supervisor: TSgt Tayamen
L.S. Connection: 2178

Building: 2177
AUTOVON: 449-6795

The 15 CES Power Production personnel perform engine oil, antifreeze and filter changes on generators at various sites. All waste oil, fluids, antifreeze and PD-680 are brought back to the shop and placed in 55-gallon drums and picked up by contractor. Waste diesel fuel is given to the fire department for use in the fire training pit. Waste battery acid is neutralized and placed down the drain. MCI aircraft soap (NSN 6850-00-935-0995, diluted 1:15) is rinsed down the drain. There is an outdoor waste storage area for waste oil, PD-680, and fuels.

Shop: 15 CAMS Fuel System Repair
Shop Supervisor: MSgt Jacome
L.S. Connection: Not connected

Building: 3004
AUTOVON: 449-1233

The 15 CAMS Fuel System Repair personnel repair aircraft fuel tanks and cells, inflight refueling receptacles and support equipment. Leak classification and detection is performed approximately once every two months using a variety of dyes and solvents. Sealants and coatings are mixed, handled and stored in this area. The major waste from this shop is JP-4 fuel. The fuel is placed in a storage tank, sampled, and then removed. If the fuel is contaminated, it is burned in the fire training pit; if the fuel is uncontaminated, it is turned in to POL for reuse.

Shop: 15 CAMS Test Cell
Shop Supervisor: SSgt Campbell
L.S. Connection: 7

Building: 3250
AUTOVON: 449-1211

Personnel of the 15 CAMS Test Cell personnel tune and test jet engines. Waste oil and JP-4 are stored in 55-gallon drums. Waste oil is picked up by a contractor. Uncontaminated JP-4 is returned to fuels maintenance while contaminated JP-4 is given to the Fire Department for use in the fire training pit. Penetone Power Cleaner 155 is used to clean generators and is rinsed off after use. There are no drains in this area.

Shop: HANG Phase Docks
Shop Supervisor: Dock 1 - MSgt Yoshimoto
 Dock 2 - MSgt Calma
 Dock 3 - MSgt Suzuki
L.S. Connection: 10 to 12

Building: 3400

Personnel from all three docks accomplish hourly post flight inspections and unscheduled maintenance on the F-4C aircraft. Waste PD-680 is stored in 55-gallon drums and disposed of by a contractor. Grease and paint (approximately 1 quart per month) on parts is wiped off with rags and then the parts are rinsed off. B&B contact X soap (NSN 6850-P-801-016-5260, MIL-C-85570) or Eldorado aircraft cleaning compound (NSN 6850-01-184-31821, MIL-C-87936) are diluted 1:4 and discharged to the sewer system.

Shop: 154 CSS HANG Photo Lab
Shop Supervisor: TSgt Biho
L.S. Connection: 10 to 12

Building: 3400
AUTOVON: 449-9374

This shop processes and prints black and white photos. Waste fixer is sent through a silver recovery process then discharged to the sewer. Waste developer is discharged to the sewer.

Shop: 154 CAM HANG NDI
Shop Supervisor: MSgt Stern
L.S. Connection: 10 to 12

Building: 3400
AUTOVON: 449-5428

Personnel of the 154 CAM HANG NDI shop perform non-destructive tests using either magnetic particle inspection or penetrant inspection of systems associated with missile, aircraft, and aerospace ground equipment.

The magnetic particle inspection is a closed system utilizing Magnetic Inspect (either: PD-680 or deodorized kerosene, and iron filings) and a large magnet to find flaws in aircraft parts. The contents of the unit is drained about every 90 days into 55-gallons drums and disposed of by contract.

The penetrant inspection (Figure 8) is an open system which uses a penetrant, emulsifier, and developer. Parts are dipped into the penetrant; removed; placed in the emulsifier; rinsed; and allowed to drip dry. The part is then placed in a developer and passed through an oven and dried. It is finally inspected and rinsed. The photo lab in the NDI shop uses fixers and developers in the developing process. The rinse water and chemicals from the process is put through two silver recovery processes before being discharged.

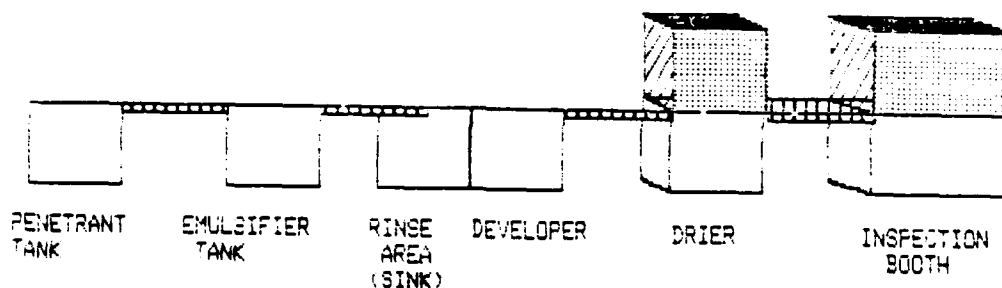


Figure 8. NDI Penetrant Inspection Process

Shop: 154 CAM HANG Pneudraulics
Shop Supervisor: MSgt Lum
L.S. Connection: 10 to 12

Building: 3400
AUTOVON: 449-1284

The 154 CAM HANG Hydraulic shop is responsible for repairing and reclaiming components of 27 F-4C aircraft. Waste hydraulic fluid and PD-680 are placed in 55-gallon drums and disposed of by a contractor.

Shop: 154 CAM HANG Wheel & Tire
Shop Supervisor: Sgt Kadekawa
L.S. Connection: 10 to 12

Building: 3400
AUTOVON: 449-6894

This shop is responsible for the breakdown, cleaning, stripping and painting of F-4C and C-130 aircraft wheels and parts. Waste PD-680 (from two 20-gallon tanks), paint and thinners are drummed and disposed of by a contractor. This shop has one strip tank (about 150 gallons containing Fine Organics 621 stripper, NSN 8010-01-040-1059) which is drained every 8 months. Parts are soaked in the stripper, drip dried, and rinsed in a sink. Waste stripper is placed in 55-gallon drums and disposed of as hazardous waste.

Shop: 154 CAM Corrosion Control
Shop Supervisor: Craig Arakaki
L.S. Connection: 12

Building: 3416
AUTOVON: 449-5712

The Corrosion Control shop is responsible for stripping, painting, cleaning and treating corrosion on F-4C and C-130 aircraft. This shop is also responsible for the HANG aircraft washrack. Waste paint is kept in a container and allowed to harden before being placed in the dumpster. Stripping wastes are collected, dried and placed in the dumpster. Soaps (B&B Contact X, NSN 6850-P801-016-5260, MIL-C-85570, B&B Contact E, NSN 6850-P801-015-5260, MIL-C-85285, or Eldorado, NSN 6850-01-184-3182, MIL-C-87936) are diluted 1:4-16 before use and rinsed off into the sewer system. PD-680, also used at the washrack on heavily soiled areas of the aircraft, is rinsed off and goes down the drain. Waste battery acid is neutralized and rinsed down the drain.

Shop: 154 CAM HANG Jet Engine
Shop Supervisor: TSgt Wahinekapu
L.S. Connection: 12

Building: 3416
AUTOVON: 449-5048

The 154 CAM HANG Jet Engine Shop Maintains F-4C and C-130 jet engines. Waste paints and thinners are stored in 55-gallon drums and disposed of as hazardous waste. Waste oil, PD-680, methyl ethyl ketone (MEK), JP-4 and stripping waste are all placed in 55-gallon drums. All wastes except JP-4 fuel are disposed of through a contractor. Uncontaminated JP-4 is returned to POL to be reused, while contaminated JP-4 is given to the Fire Department for use in fire training.

Shop: 154 CAM HANG AGE/MAF
Shop Supervisor: SMSgt DeVeaS
L.S. Connection: 12

Building: 3428
AUTOVON: 449-1518

Personnel of the 154 CAM HANG AGE/MAF shop inspect and maintain AGE equipment assigned to the Hawaii Air National Guard. Waste battery acid is neutralized and placed down the drain. Waste oils, fluids, and PD-680 are drummed and disposed of through a contractor. Eldorado cleaning compound used to clean AGE equipment is rinsed down the drain. Waste antifreeze is discharged down the drain.

Shop: 154 RMS HANG Motor Pool
Shop Supervisor: SMSgt Sato
L.S. Connection: 12

Building: 3429
AUTOVON: 449-6041

The 154 RMS Motor Pool personnel service all Air National Guard vehicles on Hickam AFB. Waste motor oil and fluids are placed in 55-gallon drums and disposed of through DRMO. JP-4 is stored in 55-gallon drums and turned in to POL. Waste battery acid (about 5 gallons per month) is neutralized and disposed of down the drain. Waste PD-680 is stored in 55-gallon drums and disposed of through DRMO. Waste paint and thinners are placed in 55-gallon drums and disposed of as hazardous waste through DRMO. Waste antifreeze is drained to the sewer system.

Shop: 15 ABW Auto Hobby Shop
Shop Supervisor: Autine Russel
L.S. Connection: 7474

Building: 4004
AUTOVON: 449-6872

The Auto Hobby shop is housed in a "garage type" building containing state-of-the-art equipment for maintenance and repair of privately owned vehicles. Waste oil and fluids are placed in bowlers and picked up by a contractor. Waste paints and thinners are drummed and disposed of by a contractor. Simple Green soap (NSN 7930-P-13008, diluted 1:10) is used to clean the floors, the rinsate is discharged to the sewer system. This shop has one Safety Kleen degreasing unit.

Shop: 15 CES Liquid Fuels Maint.
Shop Supervisor: MSgt Joiner
L.S. Connection: 7478

Building: 4016
AUTOVON: 449-1327

Personnel of the 15 CES Liquid Fuels Maintenance personnel install fuel systems, storage tanks, pumps, hydrant outlets, and filter separators. No waste is generated from this shop unless a system needs repair. Should this occur, any fuel drained from the system is collected and reused by Fuels Branch.

V. OBSERVATIONS AND CONCLUSIONS

A. Hazardous Waste Survey

1. The Hazardous Waste Program

The hazardous waste program is fairly informal and relies heavily on a one man Environmental Planning Office and the support of the Bioenvironmental Engineering (BEE) shop. The BEE shop is developing a hazardous materials computer tracking program and refining a hazardous waste disposal evaluation form for use during shop visits.

The proper development of the hazardous waste program will involve increasing mid-level management participation and additional allocation of resources. The base Environmental Protection Committee (EPC) could be the driving force, but unfortunately it only meets once a year.

2. Waste Analysis

Currently the base performs waste analysis on unknown or questionable wastes. Waste samples are collected by the BEE shop using a glass tube. The responsibility for waste identification and classification rests primary with the waste generators inventory.

Wastes requiring analysis were previously sent to the naval lab at Pearl Harbor, this support is no longer available. Most waste sample analyses are now sent to USAFOEHL.

3. Hazardous Waste Training

Hazardous waste training is a recently developed program given by the base Environmental Coordinator and DRMO (Pearl City) to shop supervisors and accumulation point managers for all bases in Hawaii. A training session was observed during the survey. The session was well organized and covered all aspects of the hazardous waste program adequately. The base BEE shop might consider participating in these training sessions.

4. Oilfall Paint Booths

The Corrosion Control shop and paint shop are using oilfall paint booths (utilizing turbine oil instead of water in the waterfall) because of a high corrosion problem with the waterfalls. The waterfall type lasted approximately 5 years and then had to be replaced. Oils from these units are drained on a semiannual basis. The paint sludge is filtered out and the oil returned to the booth. This system recycles the oil and eliminates the disposal of the water, used in waterfalls. No apparent problems with this operation were observed during our visit. In fact, these systems would probably benefit other bases as well.

5. Empty Gallon Paint Cans/Expired Shelf Life Paints

The CE Paint Shop is the collection point for all paint cans. Empty gallon paint cans are set out in the sun and allowed to dry, before disposal in the trash. Expired shelf life paint if still good are used by the paint shop for small paint jobs such as signs to reduce the amount of paint wastes. Waste paint in a paint storage shed located in the HANG Test Cell location has been awaiting disposal for some time. Finally, Civil Engineering has a household paint and pesticide recycling center for the housing area.

6. Battery Acid

Battery acid is neutralized by placing the battery in a sodium bicarbonate solution overnight. The neutralized solution is then disposed down the drain without being analyzed for metals. Recently a sample of neutralized acid was taken at the 15 CAMS Battery shop for analysis.

7. Old Lift Between Building 2000 and 2002

Between buildings 2000 and 2002 is an 8-9 foot ditch (an old garage lift was located here) that has filled up with water. Floating on top of the water was an oil layer. The transportation shop said they have been trying to get the water pumped out and the ditch filled.

8. Wheel and Tire Shop Washroom

Wheel and Tire shop personnel at HAFB said that Mirachem 250, Mirachem 100, and the rinsewater in the washroom are disposed of down the drain. These tanks according to shop personnel were never sampled. Further investigation revealed that samples were taken in Sept 85 which indicated low concentrations of heavy metals while samples taken in Apr 86 showed high levels of Cadmium (472 mg/l), Lead (9.6 mg/l) and Chromium (33 mg/l). Also, a recent sample in Jun 86 showed 3.04 mg/l of Total Chromium.

9. HANG AGE Hazardous Waste Storage Area

The hazardous waste storage area for HANG AGE is located on the HANG AGE washrack (Figure 9). This storage area is not curbed, secured, or covered. During our visit we observed shop personnel cleaning the area with soap and water with the rinsewater going to an oil/water separator located adjacent to the washrack. The soaps used in this area to clean AGE equipment may emulsify the oil and any wastes collected in the oil/water separator and this emulsified liquid are capable of passing untreated through the separator to the sewage treatment plant.



Figure 9. HANG AGE Washrack and Storage Area

10. 15 CAMS AGE section Waste Oil Storage Area

The 15 CAMS AGE waste oil storage area is located next to building 2030 (Figure 10). This site is curbed, but not secured or covered. Also, a drain is located inside the curbing. During our visit we noticed an airman cleaning a tank where oil had spilled by pouring a bucket of PD-680 over the tank to clean it and then rinsing the PD-680 and oil down the drain. The shop supervisor saw this and immediately informed the airman of the proper procedure (use a rag to wipe the outside of the tank rather than pouring PD-680 over the tank).

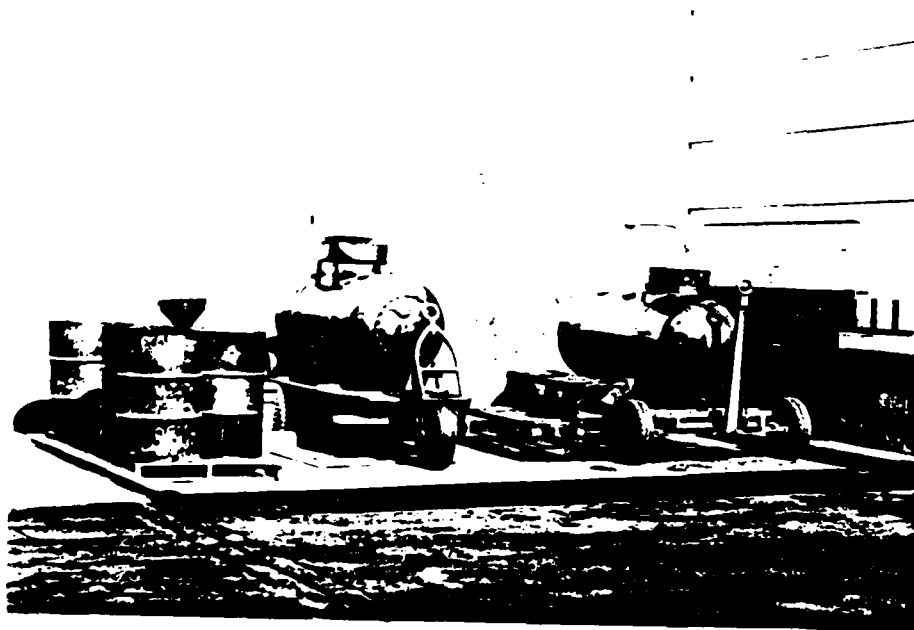


Figure 10. 15 CAMS AGE Storage Area

11. HANG Proposed Hazardous Waste Storage Site

Plans are under way in Civil Engineering to build a 20' x 20' hazardous storage area in the HANG. The new storage area will be diked, fenced, covered, and secured.

12. Drum Stenciling of Empty Waste Drums

During our survey at the 15 TRANS shops we noticed at least two empty drums prelabeled (10% paint, 20% lacquer, 70% thinner). Waste drums should only be labeled after the drums are filled in order to accurately reflect the contents of the drums. These shops were not keeping a log of the waste going into the waste drums.

13. Permitted Accumulation Sites

There are three accumulation sites on base and none are permitted because waste are removed from these sites within 90 days. Most accumulation sites, i.e., HANG Motor Pool Storage area, are not curbed, covered and secured (Figure 11), however plans are under way to upgrade these sites.



Figure 11. HANG Motor Pool Storage Area

14. Defense Reutilization and Management Office (DRMO)

DRMO is located at Pearl City (Figure 12), therefore this sometimes creates a problem with transporting hazardous waste from the base to DRMO. Currently, waste drums are inspected before transported by the Army to DRMO. The hazardous wastes are eventually shipped to the continental U.S. for disposal.

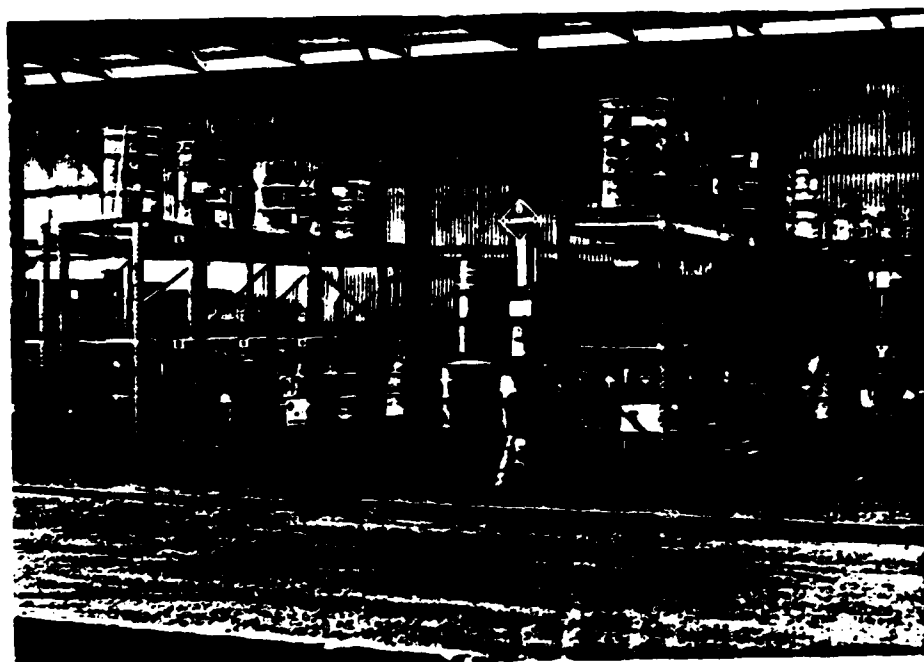


Figure 12. Pearl City DRMO Storage Area

5. Oil/Water Separator Maintenance

An unsuccessful attempt was made to locate records on oil/water separator maintenance. There seem to be some uncertainty as to who is responsible for the maintenance of the oil/water separators.

The oil/water separator at the BX service station, building 2074 needed to be serviced. Also lift station 358A had a one foot thick oil layer in the wet well which needs to be removed.

3. Wastewater Characterization Survey

1. High concentrations of chlorides were found at several lift stations, indicating seawater infiltration at lift station wet wells, sewer system or both. Lift station 358A had the highest chloride concentration, 100,000 mg/l though it contributed only 1.1% of the chloride contribution to lift stations 1 and 1A. Clearly from the review of the flow data and chloride data, significant infiltration is occurring in the gravity portions of the sewer system. Using the population figures presented before, the base has an effective population of about 13,000 and at a level of use of 150 gallons/capita, the total wastewater from the base should be 1.95 MGD. During the survey the average flow from lift station 1A was 2.53 MGD, this excludes the substantial flow from lift stations buildings 1628 and 7474 which enters the Ft Kamehameha plant via a different route. The normal range of chlorides found in sewage, even industrial effluents, is the hundreds of milligrams per liter.

An even more notable example of the seawater problem, is the chloride concentration in the effluent from the 548 RTG. According to Kodak (7), effluent from the processes used would have a chloride concentration around 500 mg/l. In the short 250 feet of sewer run, seawater had caused the concentration to rise to 12,000, indicating infiltration totaling almost double the photo waste flow.

In 1977 survey, USAFOEHL/OLAB, McClellan AFB found that lift station 1A was pumping about 1.2 MGD to Ft Kam with a chloride concentration of 4200 mg/l. During this 1987 survey, the flow has increased to 2.53 MGD with a corresponding increase in chlorides to an average of 10,300 mg/l, indicating serious deterioration in the condition of the sewer system.

2. Effluent from the 548 RTG consists of photoprocessing waste which exceeded the COMNAVBASEPEARL limitations for COD, sulfide, phenols, silver, chloride (from seawater) and hexavalent chromium (See Appendix J). The Federal Pretreatment Standard in 40 CFR 459 (8), Photographic Point Source Category, that applies limits silver and cyanide (0.030 pounds and 0.038 per 1000 square ft of product, respectively and a pH of between 6.0 and 9.0). No cyanide was detected from building 2045. However, the 548 RTG would have to produce about 44,800 square feet of product per day to meet the Federal Standard without pretreatment. In order to meet the COMNAVBASEPEARL, this operation will need better pretreatment than the existing silver recovery system provides. The pretreatment process could be envisioned to include chemical oxidation or carbon adsorption and ionic-cationic exchange. The resin regeneration waste should be contained to recover the silver and chromium.

3. Several industrial users exceeded COD limitations in the effluent from the oil/water separators and caused the servicing lift station to exceed the limitations, also. Appendix J contains the locations where the limitations were exceeded. In most cases, oil, fuel, and aircraft contact cleaner were probably the cause of the COD exceedance, though they did not necessarily exceed the relatively lenient oil and grease standard. In this class was the oil/water separators at building 3429, HANG motor pool, building 2016, the CAMS aircraft washrack separator, building 2010, the refueling maintenance, building 1203 Civil Engineering paint shop.

At one industrial source, the 548 RTG, building 2045, the high COD concentration was due to the photoprocessing chemicals, the bleach-fix and developer. It should be noted that the acid-dichromate COD test should not be used for samples containing more than 2000 mg/l chlorides.

4. The aircraft and motor pool washrack oil separation and pretreatment facility, building 2016, originally consisting of two operations, oil/water separation and physical-chemical treatment using the Permutit Colloidair system, now serves only as a gravity separation and retention basin to catch spills at either washrack. No flow was recorded from lift station 1 indicating little or no flow had passed through this facility. No aircraft or vehicle washing occurred according to the hazardous waste survey findings. The concentration of oil and grease (21 mg/l) in samples taken from just before the discharge weir was typical of adequately maintained Air Force gravity oil/water separators. The USAFOEHL report in 1977 had recommended the removal of the physical-chemical feeder equipment and the installation of belt-type oil skimmers. The feeder equipment was removed, though no oil separation equipment was installed. Concentrations of surfactant measured as MBAS were low (2.3 mg/l), while the high sulfates were not from the detergent sulfonates but probably battery acid or seawater.

5. The high concentration of soluble mercury (9.3 mg/l) from the C.E. paint shop is indicative of accidental release or inappropriate disposal practices. As no process or chemicals use mercury, other than the dental amalgams, thermometers, pressure gauges etc, the mercury must have been brought to the shop and disposed of, possibly collected from drain traps from the dental clinic or avionics shops.

6. The literature is not specifically clear as to what levels of chlorides are inhibitory to treatment processes other than in "abnormal amounts".(9) Seawater typically has a concentration of 19,000 mg/l chlorides, and 10,600 sodium or a ratio of .56 Na/Cl.(10) At L.S. 1A, the sodium concentration would be approaching 6000 mg/l, exceeding the published inhibitory concentration for anaerobic digestion of 2500 mg/l.(11) Nitrification ceases at seawater strengths of 50% (chloride concentrations around 10,000 mg/l).(12)

7. The chloride levels interfered with the TOX and COD results. Inorganic halides in concentrations above 500 mg/l interfere seriously with TOX results. The acid-dichromate COD test should not be used for samples with chloride concentrations greater than 2000 mg/l. Potassium permanganate COD test is the method of choice for saline waters.(13) Table 7 highlights which COD and TOC values should be discounted:

8. It is evident from the TOX and EPA Method 624 results that paint stripping compound rinsewater containing methylene chloride and 4-methyl phenol are being disposed of into the sewer in the HANG area, probably from the Corrosion Control Shop. This is causing the limit for total identifiable chlorinated compounds to be exceeded. Either a pretreatment system is needed, such as air stripping or powdered activated charcoal adsorption, or the waste should be drummed up and disposed of as hazardous waste. Apparently no aircraft painting was being conducted at 154 CAM Corrosion Control, according to the hazardous waste survey, thus no methylene chloride was found at lift station 1A.

VI. RECOMMENDATIONS

1. A comprehensive survey should be conducted to determine at what points seawater infiltration in the sewer system is occurring. Probably the easiest way to accomplish this would be by using a conductivity meter (available on loan from the USAFOEHL) to check the conductivity of the wastewater from manhole to manhole. An increase in conductivity in the wastewater would be indicative of possible seawater infiltration.

2. Once the sources of infiltration are identified, an aggressive program to seal the system should be undertaken. The concentration of chlorides needs to be reduced to noninhibitory levels.

3. A pretreatment system should be installed at the 548 RTG. This system should include unit processes for the oxidation and adsorption of the hydroquinones (detected as phenols), cationic exchange for silver, and ionic exchange for chromates.

4. A pretreatment system should be installed to treat paint stripping wastes. The paint stripping around the base should be combined and performed at one facility which could effectively pretreat the phenols, methylene chloride and metals in the paint sludge and rinsewater to meet effluent limitations.

5. An effort should be made to pump out the sump at building 1203 and recover the mercury in the sludge.

6. Hickam AFB should develop a comprehensive waste analysis plan. This plan should consist of a complete listing of each known waste stream with a description of the process or operation generating the waste, results of a baseline chemical analysis to fully characterize the waste, required frequency of analysis, sampling technique, and the parameters to analyze for (see Figure 13). By using such a sampling program, the base can determine, within reasonable time, rationale for classifying each waste stream as either hazardous or nonhazardous. Fortunately, the base does not have that many waste streams to characterize. Also, under the proposed AFR 19-11, Hazardous Material/Waste Management, waste stream identification and analysis is a responsibility for the BEE shop.

7. Close monitoring (sample and analysis) of the 15 CAMS Wheel and Tire shops Mirachem 100 tank, rinsewater tank, and Mirachem 250 tank prior to discharging the contents down the drain is necessary to assure that these chemicals and rinsewater are indeed nonhazardous and are not a source of high metals in the sewer system. So far, the historical sampling results are not conclusive as to whether the contents of these tanks should be disposed of down the drain.

8. Although most of the accumulation sites are awaiting upgrade, these sites should at least be secured to prevent intentional or unintentional mixing of wastes. Secured waste drums should at least help reduce uncertainty as to the content of waste drums when waste analysis are not done.

9. A few of the waste storage areas were located near drains that discharge into the sewer. Two sites we noted were the HANG accumulation site located on the AGE washrack that had waste oil drums and waste PD-680 drums, and the 15 CAMS AGE waste storage area that had waste oil drums. Both of these storage areas should be relocated or the drains at these sites should be sealed. This would eliminate any chance of spilled oils or PD-680 entering the sewer system.

10. The old lift (a ditch) located near Buildings 2000 and 2002 that contains an oil/water mixture should be pumped out and filled. This would eliminate potential of oil spreading in the surrounding area from the runoff coming from this ditch.

11. The responsibility and frequency for cleaning out the oil/water separators should be closely monitored and tracked. Oftentimes, environmental noncompliance are directly or indirectly linked to neglect in maintaining these separators.

12. A series of samples should be taken with both a coliwasa and the currently used long glass sampling tube to determine if the glass tube is giving sample results comparable to a coliwasa. This will both ensure and document that representative waste samples are being taken.

13. The silver recovery units at the 548 RTG Photo shops, Building 2045, should be checked and cartridge changed as necessary. A concentration of 13.7 mg/l silver was coming from the buildings discharge. If these units are in proper working condition, the Fixer system (Figure 7) valving should be checked to assure that the bypass valve is not leaking.

SHOP (BUILDING)	DESCRIPTION OF WASTE STREAM	BASELINE ANALYSIS (DATE)	EPA NO.	ANALYSIS FREQUENCY	SAMPLING TECHNIQUE	PARAMETERS
FMS/PAINT SHOP (110)	WASTE PAINT FROM PAINT BOOTH	(DEC 84) FP-H (70 F) PH-NH, EP-NH RX-NH	D001	SEMIANNUALLY (EACH DRUM)	COLIWASA	FLASH POINT
TRANS/BATTERY SHOP (20)	NEUTRALIZED BATTERY ACID	(JAN 86) FP-NH, EP-NH PH-NH, RX-NH	NH	ANNUAL SPOT CHECK (EVERY OTHER DRUM)	COLIWASA	LEAD, CADMIUM
CSG/MACHINE SHOP (1549)	RINSEWATER FROM 150-GALLON TANK (WEST SIDE)	(JUN 85) FP-H (120 F) PH-H (1.5) RX-NH, EP-H (CHROMIUM, CADMIUM)	D001 D002 D006 D007	QUARTERLY CLEANOUT	DIPPER	FLASH POINT, pH CHROMIUM, CADMIUM

LEGEND: FP - IGNITABILITY; PH - CORROSIVITY; RX - REACTIVITY; EP - EP TOXICITY;
H - HAZARDOUS; NH - NONHAZARDOUS

FIGURE 13. EXAMPLE OF WASTE ANALYSIS PLAN

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Appendix A

METALS RESULTS AT THE TWO 7-DAY SITES FOR THE
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

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METALS RESULTS AT THE TWO 7-DAY SITES FOR THE
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

Parameter	Site	No. detected/ 7-days	High (mg/l)	Low	Avg
arsenic	L.S. 1A	0	--	--	--
	L.S. 12	0	--	--	--
cadmium	L.S. 1A	3	.018	.014	.0163
	L.S. 12	0	--	--	--
total chromium	L.S. 1A	2	.127	.068	.0975
	L.S. 12	0	--	--	--
copper	L.S. 1A	7	.037	.023	.028
	L.S. 12	1	--	--	.023
lead	L.S. 1A	0	--	--	--
	L.S. 12	2	.045	.040	.0425
mercury	L.S. 1A	1	--	--	.022
	L.S. 12	0	--	--	--
nickel	L.S. 1A	1	--	--	.054
	L.S. 12	0	--	--	--
selenium	L.S. 1A	0	--	--	--
	L.S. 12	0	--	--	--
silver	L.S. 1A	6	.424	.010	.203
	L.S. 12	1	--	--	.010
zinc	L.S. 1A	7	.348	.151	.232
	L.S. 12	7	1.05	.188	.358
antimony	L.S. 1A	4	.016	.011	.014
	L.S. 12	0	--	--	--
beryllium	L.S. 1A	0	--	--	--
	L.S. 12	0	--	--	--
thallium	L.S. 1A	0	--	--	--
	L.S. 12	0	--	--	--
tin	L.S. 1A	2	.013	.011	.012
	L.S. 12	0	--	--	--
chloride	L.S. 1A	7	36000	2080	10311
	L.S. 12	7	1440	650	1067

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Appendix B

DETECTABLE METAL RESULTS FOR 24 HOUR COMPOSITE AND
OIL/WATER SEPARATOR GRAB SAMPLE SITES

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DETECTABLE METAL RESULTS FOR 24 HOUR COMPOSITE AND
OIL/WATER SEPARATOR GRAB SAMPLE SITES

<u>Site</u>	<u>Parameter</u>	<u>Conc. (mg/l)</u>
Bldg 358A lift station	cadmium	.032
	Copper	.046
	lead	.046
	nickel	.143
	zinc	.153
	silver	.041
	chloride	100,000
Bldg 3021 lift station	copper	.024
	zinc	.362
	tin	.016
	chloride	100
Bldg 84 lift station	lead	.042
	zinc	.646
	tin	.012
	chloride	700
Bldg 2178 lift station	zinc	.646
	chloride	10,000
C.E. paint shop Bldg 1203	arsenic	.012
	copper	.257
	mercury	9.73
	zinc	1.1
	chloride	120
Bldg 3429	copper	.036
	lead	.036
	zinc	.226
	chloride	78.0
Bldg 3004	tin	.070
	zinc	.288
	chloride	104
Bldg 3426	cadmium	.016
	copper	.063
	lead	.088
	zinc	1.02
	chloride	89.0
Bldg 2016	cadmium	.055
	total chromium	.064
	copper	.060
	tin	.030
	nickel	.247
	silver	.048
	zinc	.200
	chloride	17,000

<u>Site</u>	<u>Parameter</u>	<u>Conc. (mg/l)</u>
Bldg 72130	zinc	.101
	chloride	67.0
Bldg 2010	cadmium	.023
	copper	.028
	lead	.039
	nickel	.096
	silver	.017
	zinc	.983
	antimony	.019
	chloride	5750
Test Cell	zinc	.282
	chloride	130
Bldg 4002	lead	.096
	zinc	1.11
	chloride	105
Lift Station 10	arsenic	.012
	cadmium	.014
	copper	.024
	lead	.025
	tin	.210
	nickel	.076
	silver	.010
	zinc	.579
	antimony	.013
	chloride	3500
Bldg 1623 lift station	copper	.035
	zinc	.197
	chloride	110
Bldg 7474 lift station	zinc	.085
	antimony	.011
	chloride	1880
Bldg 2045 (Photo Recon)	arsenic	.210
	cadmium	.035
	total chromium	1.14
	copper	.077
	mercury	.056
	nickel	.080
	silver	13.7
	zinc	.338
	chloride	12,000

*Note: Three 24 hour composite samples were collected at Bldg 2045. The greatest concentration for each detected parameter has been included.

Appendix C

RESULTS FOR VARIOUS PARAMETERS AT THE HICKAM AFB 7-DAY SITES

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RESULTS FOR VARIOUS PARAMETERS AT THE HICKAM AFB 7-DAY SITES

Parameter	Site	No. detected/ 7-days	High (mg/l)	Low	Avg
sulfides	L.S. 1A	7	.40	.10	.21
	L.S. 12	6	.40	.12	.28
sulfates	L.S. 1A	7	600	380	484
	L.S. 12	7	320	43	248
TOC	L.S. 1A	7	100	25	38.7
	L.S. 12	7	63	20	39
oil and grease	L.S. 1A	7	31.2	11.2	19.4
	L.S. 12	6	109.6	9.6	68.3
cyanide	L.S. 1A	3	.01	.01	.01
	L.S. 12	3	.02	.01	.013
phenols	L.S. 1A	6	.160	.040	.087
	L.S. 12	6	.120	.020	.047
fluoride	L.S. 1A	7	.74	.64	.71
	L.S. 12	7	1.34	.54	.75
MBAS	L.S. 1A	7	.60	.40	.50
	L.S. 12	7	.70	.20	.43
color	L.S. 1A	7	35 units	15	21.8
	L.S. 12	5	20	8.0	14.6

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Appendix D

VARIOUS SAMPLING RESULTS FOR 24 HOUR COMPOSITE AND GRAB SAMPLE SITES AT
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

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VARIOUS SAMPLING RESULTS FOR 24 HOUR COMPOSITE AND GRAB SAMPLE SITES AT
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

# Site	Sulfides	TOC	TOX	Oil and Grease	CN	Phenols (units)	Color	Fl-	SO ₄	MBAS
-----mg/l-----										
3 2045	10	226	.039	1.8	ND	3.0	45	.60	61	NR
4 2178	ND	8.0	.048	6.2	.02	.016	25	1.0	390	.30
5 1628	.20	65	.022	65	ND	.028	12	.52	24	5.2
7 3429	ND	27	.084	26.4	ND	.236	15	ND	20	.50
8 LS10	6.67	130	.117	560	ND	ND	15	1.0	11	5.3
9 LS84	.13	7.0	.020	29.6	ND	.020	NR	.80	280	.10
10 LS87	ND	40	.056	8.0	.03	.092	45	.10	32	.40
11 358A	ND	6.0	.331	4.0	ND	.120	15	1.1	1440	.80
12 7474	ND	2.0	.094	1.4	ND	.020	5.0	.88	390	.30
13 3004	ND	53	.060	1.5	ND	.600	35	.70	5.0	1.7
14 2016	4.9	33	.086	21	ND	.200	12	.76	1900	2.3
15 T2130	.10	8.0	.034	.50	.01	.040	40	.30	10	.201
16 3428	.20	400	.116	4.1	.01	1.4	15	.30	17	156
18 2010	4.1	21	.113	38	.01	.080	20	.60	480	1.9
20 T.Cell	4.4	36	.027	5.8	ND	.320	25	.28	15	.30
22 4002	.10	47	.611	6.5	ND	.056	12	.54	14	.10
23 1203	.20	100	.063	48.4	ND	.040	NR	.54	46	8.0

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Appendix E

DETECTABLE CONCENTRATIONS OF PESTICIDES AND POLYCHLORINATED BIPHENYLS
FOR THE HICKAM WASTEWATER CHARACTERIZATION SURVEY

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DETECTABLE CONCENTRATIONS OF PESTICIDES AND POLYCHLORINATED BIPHENYLS
FOR THE HICKAM WASTEWATER CHARACTERIZATION SURVEY

Site	Date	Parameter	Conc. (ug/l)
Bldg 7474 lift station	16 Jan	DDD	.09
		DDE	.06
		Dieldrin	.06
		Heptachlor	.14
		Heptachlor epoxide	.07
		alpha-BHC	.14
		delta-BHC	.07
Bldg 2045 Photo shop	19 Jan	Endrin	.07
Lift station 12	20 Jan	Chlordane	.48
Lift station 1A	20 Jan	Dieldrin	.04
		Endrin	.21
CE Paint shop	20 Jan	Endrin	.02
Bldg 3021	21 Jan	Aldrin	.04
		DDE	.03
		Endrin	.53
		Heptachlor	.04
		Heptachlor epoxide	.03
		Lindane	.02
		alpha-BHC	.02
Bldg 84 lift station	21 Jan	DDD	.05
		DDE	.02
		Endrin	.12
		Heptachlor epoxide	.03
		Chlordane	.62
Lift station 1A	21 Jan	Endrin	.12
Lift station 12	21 Jan	DDE	.03
		Heptachlor	.03
		Heptachlor epoxide	.10
		Chlordane	.66
Lift station	22 Jan	Chlordane	.30

*NOTE: All sites were nondetectable for PCBs.

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Appendix F

DETECTABLE CONCENTRATIONS OF VOLATILE ORGANIC, ACID EXTRACTABLE,
AND BASE NEUTRAL EXTRACTABLE COMPOUNDS

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DETECTABLE CONCENTRATIONS OF VOLATILE ORGANIC, ACID EXTRACTABLE,
AND BASE NEUTRAL EXTRACTABLE COMPOUNDS

Site	Date	Parameter	Conc. (µg/l)
Lift Station 1A	15 Jan	4-methyl phenol	31
	17 Jan	benzoic acid	210
	20 Jan	acetone	36
	21 Jan	toluene	5.0
		acetone	32
		phenol	80
		4-methyl phenol	290
Lift Station 12		benzoic acid	130
	17 Jan	4-methyl phenol	38
	18 Jan	benzoic acid	170
	19 Jan	4-methyl phenol	88
	20 Jan	Methylene chloride	220
		4-methyl-2-pentanone/	27
	21 Jan	phenol	29
		4-methyl phenol	28
		benzoic acid	76
	22 Jan	acetone	480
		phenol	100
		4-methyl phenol	220
Lift Station 10	15 Jan	4-methyl phenol	430

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Appendix C

RESULTS FOR pH, TEMPERATURE, AND CONDUCTIVITY FOR
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

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RESULTS FOR pH, TEMPERATURE, AND CONDUCTIVITY FOR
HICKAM AFB WASTEWATER CHARACTERIZATION SURVEY

Date	Sample Site	pH	Temp(C)	Conductivity
15 Jan	Bldg 3004	7.1	23	480
15 Jan	Bldg 3426	6.8	24	550
15 Jan	Bldg 3429	7.1	25	350
15 Jan	Lift Station 1A	7.2	23	NR
15 Jan	Lift Station 10	7.1	24	NR
16 Jan	Bldg 2010	7.5	24.5	175
16 Jan	Bldg 2016	7.2	24.5	340
16 Jan	Lift Station 1A	7.3	23	100
16 Jan	Lift Station 10	6.75	23	100
17 Jan	Lift Station 1A	6.95	25	7800
17 Jan	Lift Station 12	7.1	26	2700
17 Jan	Test Cell	6.8	26	700
17 Jan	Bldg 7474	7.1	24	5200
17 Jan	Bldg 1628	6.7	25	700
17 Jan	Bldg 4002	6.7	26	600
18 Jan	Bldg T2130	7.4	23	480
18 Jan	Lift Station 12	7.3	23	2800
18 Jan	Lift Station 1A	7.2	23	7200
19 Jan	Lift Station 12	7.47	23	4350
19 Jan	Bldg 2045	7.82	23	780
19 Jan	Lift Station 1A	7.28	24	7000
20 Jan	Lift Station 12	7.3	26	5200
20 Jan	Bldg 2178	7.6	26	4400
20 Jan	Lift Station 1A	7.2	26	9000
20 Jan	Bldg 2045	6.5	26	12000
21 Jan	Bldg 358A	7.4	24	27000
21 Jan	Lift Station 12	7.2	25	2750
21 Jan	Lift Station 1A	7.6	25	5600
21 Jan	Bldg 2045	6.9	25	3000
22 Jan	Lift Station 1A	7.1	22	7000
22 Jan	Lift Station 12	7.2	22	4700
22 Jan	Lift Station 8	8.1	22	1000
22 Jan	Bldg 84	7.3	22	2800
22 Jan	CE Paint Shop	7.4	22	600
23 Jan	Lift Station 12	7.4	23	2800

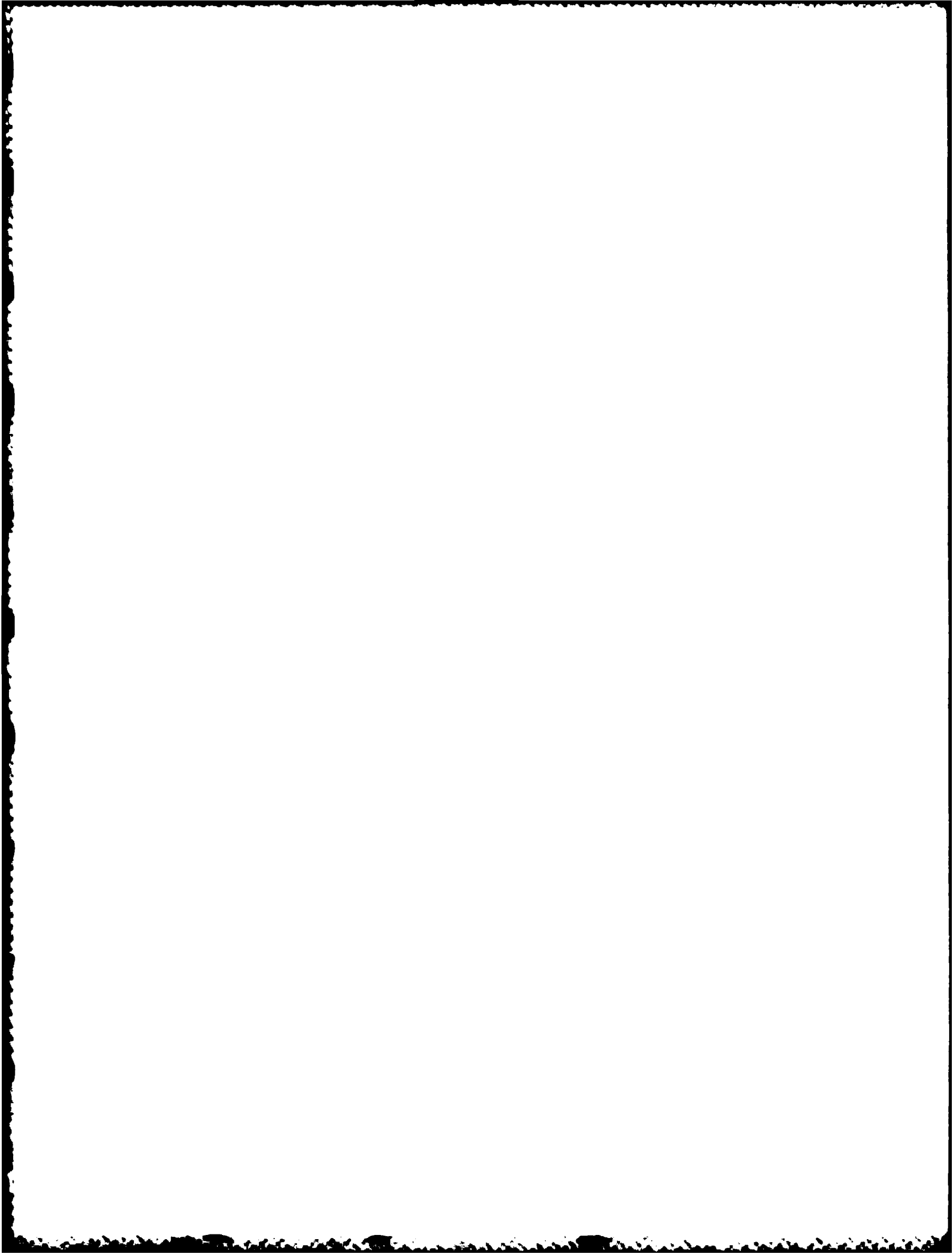
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Appendix H
SUMMARY OF WASTE DISPOSAL PRACTICES

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SUMMARY OF WASTE DISPOSAL PRACTICES

1. Waste paints and thinners are drummed and disposed of as hazardous waste through Pearl City (DRMO).
2. Waste stripper in the stripping tanks is drained into 55-gallon drums and disposed of as hazardous waste through DRMO. Waste paint stripped from parts is allowed to dry to a solid and thrown in the trash.
3. Waste battery acid is neutralized and disposed of down the drain.
4. Nonflammable petroleum products (i.e., oils and fluids) is disposed of through the navy.
5. Flammable petroleum products are disposed of through a contractor at a cost of 5 dollars per gallon.
6. Waste uncontaminated PD-680 is taken and burned by the Navy. If the PD-680 is contaminated it is disposed of through DRMO as hazardous waste.
7. Uncontaminated JP-4 is given to POL and returned to the base's main fuel tanks. Contaminated JP-4 is given to the fire department and burned in their fire training pit.
8. Uncontaminated automotive fuel is returned to the gas tank of the vehicle it was removed from. Contaminated diesel is given to the fire department and burned in the fire training pit.
9. Waste antifreeze is disposed of down the drain.
10. Waste fixer is sent through a silver recovery process and then disposed of down the drain. All other photo wastes are disposed of down the drain.
11. Waste emulsifier is placed in a drum and disposed of as hazardous waste through DRMO. Waste penetrant is disposed of down the drain.



Appendix I

LIST OF CHEMICALS BY SHOP,
WITH NSN AND MIL SPECIFICATIONS

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LIST OF CHEMICALS BY SHOP WITH
NSN AND MIL SPECIFICATIONS

Chemicals

Building	Shop	Chemical	Mil Spec	NSN
1045	15 CAMS Propulsion	Penetone 23	n/a	LP 7930-P-13008
		Simple Green Soap	n/a	LP GS-00F-79037
		PD-680	n/a	6850-00-285-8011
1055	15 CAMS Corrosion Control	Intex Paint Stripper	n/a	8010-00-348-7716
		PD-680	n/a	6850-00-285-8011
		Eldorado Aircraft Cleaning Compound	n/a	6850-01-181-7178
		Methyl Ethyl Ketone	n/a	6810-00-281-2762
		Acetone Tech	n/a	6850-00-184-4796
		Toluene	n/a	6850-00-281-2002
		Alum Alodine	n/a	8030-00-779-4699
		Methyl Iso Ketone	n/a	6810-00-286-3785
		Thinner	MIL 81772	8010-00-181-8080
1055	15 CAMS Repair and Reclamation/Wheel and Tire	GSA Paint Remover	n/a	8010-01-040-1059
		Toluene	n/a	6810-00-290-0048
		Aliphatic Naphtha	n/a	6810-00-238-8119
		Ethyl Alcohol	n/a	6810-00-250-6808
		PD-680	n/a	6850-00-285-8011
		Paint Remover	n/a	8010-00-160-5800
		Mirachem 100	n/a	6850-PWIS-6-8074
		Mirachem 250	n/a	n/a
		Cleaning Compound	n/a	6850-00-144-9816
				6850-00-PA-223
		Carbon Remover	n/a	6850-00-PA-215
		Methyl Ethyl Ketone	n/a	6810-00-281-2785
		CPC	n/a	8030-00-231-2353
				8030-00-838-7789
		Hydraulic Oil	n/a	9150-00-233-4134
				9150-00-252-6383
		Paint Shripper	MIL-R-83936B	n/a
1055	15 CAMS Pneudralics	PD-680	n/a	6850-00-274-5421
		Oil	MIL-H-83282	
		Trichlorotrifluoroethane	n/a	6850-00-984-5854
		Hydraulic Fluid	MIL-H-5606C	
		1,1,1 Trichloroethane	n/a	6810-00-930-6311

Building	Shop	Chemical	Mil Spec	NSN
1055	15 CAMS Battery	PD-680	n/a	6850-00-285-8011
		Sulfuric Acid	n/a	6810-00-893-8138
		Sodium Bicarbonate	n/a	6810-00-297-0092
		Glyptal	n/a	5970-00-583-0401
		Grease	MIL-G-81322C	9150-00-145-0268
		Grease	MIL-G-10924C	9150-00-190-0905
		Grease	MIL-G-21164C	9150-00-754-2595
		Alodine	n/a	8030-00-779-4699
		Naphtha	n/a	6810-00-238-8119
1203	15 CES Paint Shop	Synthetic Thinner	n/a	8010-00-160-5794
		Lacquer Thinner	n/a	8010-00-160-5787
		Paint Stripper	n/a	8010-00-160-5800
1073	15 TRANS Special Purpose Vehicle	Simple Green Soap	n/a	6850-P-100-DEGREAS
		Engine Oil	n/a	n/a
		Antifreeze	n/a	n/a
		Power Steering Fluid	n/a	n/a
		Brake Fluid	n/a	n/a
		Transmission Fluid	n/a	n/a
1102	1363 Still Photo	EP2 Developer	n/a	6750-01-148-3602
		C41 Developer	n/a	6750-01-041-8683
		E-6 Developer	n/a	6750-01-033-5153
		EP2 Bleach/Fix	n/a	n/a
		C41 Bleach	n/a	6750-01-033-5151
		E-6 Bleach	n/a	6750-01-064-7321
1218	15 CES Entomology	Baygon	n/a	n/a
		Duriban	n/a	n/a
		Malathion	n/a	n/a
		Diazinon	n/a	n/a
2002	15 TRANS General Repair	Simple Green Soap	n/a	6850-P-100-DEGREAS
		Motor Oil	n/a	9150-00-186-6703
		Power Steering Fluid	n/a	n/a
		Brake Fluid	n/a	9150-843-1636
		Cleaning Compound	n/a	6150-00-261-7899
		Grease	n/a	9150-00-668-9795
		Penetrating Oil	n/a	9150-00-261-7899
		Transmission Fluid	n/a	9150-00-698-2382
		Antifreeze	n/a	6850-00-181-7940
2002	15 TRANS Auto Body	Paints	n/a	n/a
		Thinners	n/a	n/a

Building	Shop	Chemical	Mil Spec	NSN
2030	15 CAMS NDI	Penetrant	n/a	n/a
		Emulsifier	n/a	n/a
		Developer Met-L-Check	n/a	n/a
		Mag. Particle Premix	n/a	n/a
		Kodak Fixer	n/a	n/a
		Kodak Developer	n/a	n/a
2030	5 CAMS AGE	Hydraulic Fluid	MIL-H-5606E	9150-00-265-9408
		Alkaline Cleaner	MIL-C-43616C	6850-01-045-7931
		Nitrocellulose	n/a	8010-00-160-5787
		Thinner	MIL-T-81772	8010-00-181-8080
		Paint Remover	MIL-R-81294B	8010-00-181-7568
		PD-680	n/a	6850-00-285-8011
		Freon 12	MIL-G-18709A	9150-00-663-9765
		JP-4	n/a	9130-256-8613
		Turbine Lube Oil	MIL-1733/G	9150-00-235-9062
2040	619 MASSQ FMS Assembly	Hydraulic Fluid	MIL-H-83282	9150-00-149-7431
2040	619 MASSQ FMS Jets	10/10 Oil	n/a	9150-00-231-6676
		JP-4	n/a	9130-256-8613
2040	619 MASSQ FMS Avionics	JP-4	n/a	9130-256-8613
		Hydraulic Fluid	MIL-5606	9150-00-252-6383
		Instrument Oil	MIL-16085A	n/a
		Lube Oil	MIL-22851B	9150-00-167-6889
2040	619 MASSQ FMS AGE	PD-680	n/a	6850-00-285-8011
		Aircraft Cleaning Compound	MIL-C-25769J	6850-00-935-0995
		Steam Turbine Oil	MIL-L-17331G	n/a
		Automotive Fuel	n/a	n/a
		JP-4	n/a	9130-256-8613
		Motor Oil	n/a	9150-00-186-6703
2040	619 MASSQ OMS	Oils	MIL-L-7808	9150-00-782-2627
			MIL-L-23699C	9150-00-985-7099
			MIL-L-06081B	9150-00-273-2388
		Hydraulic Fluid	MIL-L-83282	9150-00-149-7431
		JP-4	n/a	9130-256-8613
2036	15 CES Fire Dept.	Ansul (3%) AFFF	n/a	n/a
		40 Wt Oil	n/a	9150-00-188-9862
		30 Wt Oil	n/a	9150-00-189-6729
		Penetone 110	n/a	6850-00-753-5000
		Aircraft Soap	n/a	6850-00-935-0996
		PF 680	n/a	6850-00-284-8012
		Simple Green	n/a	n/a

Building	Shop	Chemical	Mil Spec	NSN
2045	548 RTG Photo	Ethylene Glycol	n/a	6850-00-181-7929
		Kodak Photo Flo	n/a	6750-00-985-4634
		Hunts ER Developer	n/a	6750-00-151-6036
		Clayton Fixer	n/a	6750-00-965-4843
		Kodak 641 Developer	n/a	6750-00-431-8655
		Acetic Acid	n/a	6810-00-275-1215
		Kodak Tetrachloroethylene	n/a	6850-PT-CEX-2418
		Kodak E-6 AR	n/a	n/a
		Kodak R-3	n/a	n/a
		Formaldehyde	n/a	6750-00-053-3364
		Bleach	n/a	6810-00-598-7361
2177	15 CES Power Pro	PD-680	n/a	6850-00-285-8011
		Sulfuric Acid	n/a	6810-00-893-8138
		Sodium Bicarbonate	n/a	6810-00-297-0092
		Aircraft Soap	n/a	6850-00-935-0995
		Motor Oil	n/a	n/a
		Antifreeze	n/a	6850-00-181-7940
3004	15 CAMS Fuel Syst. Repair	Methyl Ethyl Ketone	n/a	6810-00-281-2761
		Ammonia Hydroxide	n/a	6810-00-222-9643
		Lube Oil Compound	n/a	9150-00-265-7301
		Cleaning Compound	n/a	6850-00-538-0929
3429	154 HANG Motor Pool	PD-680	n/a	6850-00-285-8011
		Gamlin	n/a	6850-P-GAMLIN
		30W Oil	n/a	n/a
		40W Oil	n/a	n/a
		Dextron Trans Fluid	n/a	n/a
		Trans Fluid	n/a	n/a
		Brake Fluid	n/a	n/a
		Sulfuric Acid	n/a	6810-00-893-8138
		Antifreeze	n/a	6850-00-181-7940
		Sodium Bicarbonate	n/a	6810-00-297-0092
3250	15 CAMS Test Cell	Penetone 155	n/a	n/a
		Oil	MIL-L-23699	n/a
		10/10 Oil	MIL-L-6081	n/a
3400	154 HANG Phase Dock	Epoxy Stripper	n/a	8010-00-181-7568
		PD-680	n/a	6850-P-GAMLINCW
		Aircraft Cleaning Compound	MIL-C-85570	6850-P-8010165260
			MIL-C-87936	6850-01-184-3182
3400	154 HANG Photo Lab	Delcitol (D-72)	n/a	6750-00-945-6529
		HC-110 Developer	n/a	6750-00-837-7257
		Indicator Stop Bath	n/a	6750-00-577-4624
		Fixer	n/a	6750-00-802-5470

Building	Shop	Chemical	MIL Spec	NCN
3400	154 HANG NOI	Sherwin Inc (Penetrant)	n/a	n/a
		Sherwin Inc (Emulsifier)	n/a	n/a
		Sherwin Inc (Developer)	n/a	n/a
		Dupont X-ray Developer	n/a	n/a
		Dupont X-ray Fixer	n/a	n/a
3400	154 HANG Pneudraulics	PD-680 Hydraulic Fluid	n/a MIL-H-83282 MIL-H-46170	6850-00-285-8011 n/a n/a
3400	154 HANG Wheel & Tire	Fine Organics 621 PD-680	n/a n/a	8010-01-040-1059 6850-00-285-8011
3416	154 HANG Corrosion Control	B&B 1567A PD-680 B&B Contact E B&B Contact X Aircraft Cleaning Compound Alodine Deoxidizer	*T.O. 1-8-8 n/a MIL-C-85285 MIL-C-85570 MIL-C-87936 MIL-C-81706 MIL-C-38334	8010PB&B1576A 6850-00-285-8011 6850-P-8010155260 6850-P-8010165260 6850-01-184-3132 n/a n/a
3415	154 HANG JEIM	MEX PD-680 Aircraft Soap Oil 1010 Oil Trichloroethane Thinner Acetone	n/a n/a n/a MIL-L-7808 n/a n/a n/a n/a	6810-00-281-2785 6850-00-285-8011 4524-00-978-5643 9150-00-782-2627 9150-00-231-6676 6810-00-930-6311 6810-00-664-0387 8010-00-160-5788 6810-00-184-4796
3428	154 HANG AGE/MAF	Thinner Aircraft Soap (Eldorado) Oils PD-680 Sulfuric Acid Antifreeze Sodium Bicarbonate	n/a n/a n/a n/a n/a n/a	8010-00-160-5788 6850-01-181-3182 6850-01-184-7453 n/a 6850-00-285-8011 6810-00-893-8138 6850-00-181-7940 6810-00-297-0092
4004	15 ABW Auto Hobby	Simple Green Oils Auto Paints Thinners	n/a n/a n/a n/a	7930-P-13008 n/a n/a n/a

n/a - not available from shop during survey

* T.O. 1-1-8 - no mil spec in tech order only chemical listing

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Appendix J

SAMPLE SITES WITH ONE OR MORE PARAMETERS EXCEEDING
STATE WASTEWATER DISCHARGE LIMITATIONS

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SAMPLE SITES WITH ONE OR MORE PARAMETERS EXCEEDING
STATE WASTEWATER DISCHARGE LIMITATIONS

Site	Parameter(s) exceeding permit limits	Cons.(s) found (mg/l) exceeding MAX.	Avg conc. found exceeding AVG.	Max. allowable one day conc. (MAX)	Allowable 30-day average conc. (AVG)
Bldg 3429	COD	6000	NA	1200	600
Bldg 3428	COD	2500	NA	1200	600
	MBAS	156	NA	30	15
Bldg 2016	COD	6000	NA	1200	600
	chloride	17000	NA	8000	5000
	sulfate	1900	NA	1000	600
Bldg 2010	COD	10000	NA	1200	600
L.S. 10	COD	7000	NA	1200	600
	TSS	1071	NA	600	300
Bldg 3404	oil and grease	560	NA	150	75
	sulfides	6.67	NA	5.0	.50
Bldg 7474 L.S.	COD	1300	NA	1200	600
Bldg 358A L.S.	COD	1500	NA	1200	600
	Chloride	100000	NA	8000	5000
	sulfate	1440	NA	1000	600
Bldg 2178 L.S.	chloride	10000	NA	8000	5000
CE Paint shop	mercury	9.73	NA	.05	.01
	TSS	1204	NA	600	300
	COD	5700	NA	1200	600
Bldg 2045 (photo)	COD	2000	820	1200	600
	sulfides	22, 8.0	10.0	5.0	.50
	phenols	3.0	1.46	2.0	1.0
	silver	3.1, 13.7	5.6	1.0	.50
	chloride	12000	5543	8000	5000
	chromium +6	.50	.42	.50	.25
L.S. 1A	COD	5000, 1400	1170	1200	600
	chloride	36000, 23000	10311	8000	5000
L.S. 12	COD	1300	NA	1200	600

Note: 24 hour composite samples were taken at L.S. 1A and L.S. 12 for seven days, and at Bldg 2045 for three days. The remaining sites were either single 24 hour composites or one day grab samples.

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HQ AFSC/SGPB
Andrews AFB DC 20334-5000

HQ USAF/SGPA
Bolling AFB DC 20332-6188

HQ PACAF/DE
Hickam AFB HI 96853-5300

HQ PACAF/SG
Hickam AFB HI 96853-5300

HQ PACAF/SGPB
Hickam AFB HI 96853-5300

AAMRL/TH
Wright-Patterson AFB OH 45433-6573

USAF Regional Medical Center Wiesbaden/SGPB
APO New York 09220-5300

OL AD, USAFOEHL
APO San Francisco 96274-5000

USAFSAM/TSK
Brooks AFB TX 78235-5301

USAFSAM/EDH
Brooks AFB TX 78235-5301

Defense Technical Information Center (DTIC) Cameron Station
Alexandria VA 22319

HQ USAF/LEEV
Bolling AFB DC 20330-5000

HQ AFESC/RDV
Tyndall AFB FL 32403-6001

USAF Clinic Hickam/SGPB
Hickam AFB HI 96853-5300

15 ABW/DEEV
Hickam AFB HI 96853-5300

END

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